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BEFORE THE ARIZONA CORPORATION COMMISSION

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AZ CORP COMMISSION
DOCKET CONTROL

COMMISSIONERS

Kristin K. Mayes – Chairman
Gary Pierce
Paul Newman
Sandra D. Kennedy
Bob Stump

IN THE MATTER OF THE APPLICATION OF ARIZONA WATER COMPANY, AN ARIZONA CORPORATION, TO EXTEND ITS EXISTING CERTIFICATE OF CONVENIENCE AND NECESSITY AT CASA GRANDE, PINAL COUNTY, ARIZONA	DOCKET NO. W-01445A-05-0469 REQUEST FOR ADDITIONAL TIME FOR COMPLIANCE FILING

Decision No. 68607, which was entered in this docket on March 23, 2006 (the "Decision"), directed Arizona Water Company (the "Company"), the applicant in this docket, to file certain items as a compliance filing within certain time frames provided in the Decision. A factual background/compliance timeline is as follows:

1. The Company was required to file copies of Certificates of Assured Water Supply ("CAWS"), Approvals to Construct ("ATC") and Main Extension Agreements ("MXA") for Parcels 3, 4, 5, 6 and 7 within two years of the entry of the Decision.

2. On February 12, 2007, the Company filed in this docket a copy of the required CAWS, ATC and MXA for Parcel 6 complying fully with the Decision.[1]

[1] Decision No. 68607 did not require any compliance items for Parcel 1. The Decision granted an Order Preliminary for Parcel 8, and AWC was required to obtain a consent, franchise, or permission from the City of Eloy, within one year of the date of the Decision. AWC was unable to satisfy the requirement for Parcel 8 and the Order Preliminary became null and void.

U:\CC&N\CASA GRANDE\MULTIPLE PARCELS\REQUEST FOR ADDITIONAL TIME_MULTIPLE PARCEL CCN_2 OCTOBER 2009 FINAL.DOC

3. In mid to late 2006, the housing market in Arizona began its current decline.

4. Before a developer can plat any subdivision within an Active Management Area, the Arizona Department of Water Resources ("ADWR") must have issued a CAWS.

5. The ADWR requires proof of water supplies physically available to serve a planned subdivision for a minimum of one hundred years and will not issue a CAWS without such proof.

6. The Company contracted with Clear Creek Associates, a highly respected professional hydrologic engineering firm to prepare a regional groundwater model for the Company's entire Pinal Valley Water Service Area ("PVWSA"), which includes Parcels 3, 4, 5 and 7, demonstrating sufficient physically available groundwater supplies to serve the PVWSA.

7. On November 15, 2007, on the Company's behalf, Clear Creek Associates filed a Physical Availability Demonstration ("PAD") application with ADWR demonstrating more than sufficient groundwater supplies for over one hundred years.

8. The Company's PAD is critical to allowing the developers of Parcels 3, 4, 5 and 7 to pursue CAWS for each respective parcel, and a CAWS is not possible at this time until the Company's PAD has been approved by ADWR.

9. In December of 2007, most major economists declared the beginning of a deep recession, affecting the entire country and further depressing the housing market.

10. On January 28, 2008, the Company filed a request for an extension of time, until March 23, 2010, to comply with Decision No. 68607 concerning parcels 3, 4, 5 and 7.

11. On November 20, 2008 ADWR sent an Administrative Completeness Review letter (see Attachment 7 hereto) concerning the PAD to Clear Creek Associates indicating the remaining information needed to make the PAD application complete and following months of multiple meetings, and several updated submittals made by Clear Creek Associates to ADWR providing additional information and refinements to the regional groundwater model submitted with the initial PAD application.

12. Clear Creek Associates and the Company believe that its last updated PAD submittal, made on September 3, 2009 fully addressed all of ADWR's requirements and expects a favorable determination by ADWR within the next few months.

13. Most economists believe that the current recession ended on or about July-August 2009 (see Attachment 9, hereto).

14. Housing permits for single family residences issued in Pinal County, Arizona, where Parcels 3, 4, 5 and 7 are located, dropped from an annual peak of 11,371 in 2005 to 3,104 in 2008. The numbers of new housing permits continued to drop into 2009 which shows 1,507 permits issued through August 2009, however, over the past couple of months, housing permits have increased in Pinal County with the month of august 2009 showing 258 new permits compared with 205 permits in august 2008 (see Attachment 10 hereto).

15. The developers of Parcels 3, 4, 5 and 7, as well as any developer with a subdivision located in any AMA, cannot plat a subdivision without a CAWS, effectively preventing such developer from entering into an MXA or moving forward towards construction by preparing construction drawings and submitting to ADEQ for an ATC.

16. On March 11, 2008 the Commission approved the Company's request for an extension of time to comply with the compliance requirements for parcels 3, 4, 5 and 7 until March 23, 2010.

The Company is now requesting additional time to file the required compliance items for Parcels 3, 4, 5 and 7 in compliance with the Decision. In support of its request, the Company respectfully further provides as follows:

1. A map of the extension area is attached hereto as Attachment 1.

2. With respect to Parcels 3, 4, 5, and 7 the Company is requesting that the current compliance deadline, March 23, 2010, be extended for an additional two (2) year period, until March 23, 2012. In support of this request the Company submits the following:

   a. Letters from the owners of Parcels 3, 4, 5 and 7, are attached hereto as Attachments 2, 3, 4, 5, and 6, respectively. As noted in each letter, each owner still plans to develop its property and still needs and desires to receive water service from the Company.

   b. The Company is now providing water service to 93 customers in the extension area approved in the Decision. Service to these 93 customers may be adversely affected if the Company's request for an extension of time is not approved.

   c. With respect to the compliance requirement to file a Certificate of Assured Water Supply - as documented by Attachments 7 and 8 hereto, and as noted in paragraphs 4 through 12, above, the Company has retained the firm of Clear Creek Associates to file a Physical Availability Demonstration ("PAD")

Application with the Department of Water Resources ("ADWR") for an area that includes the extension area described in Attachment 1. ADWR has commented on the PAD Application, and the Hydrologist, as evidenced by its September 3, 2009 letter (Attachment 8) to ADWR and is working diligently with ADWR to complete the Application.

While the PAD is not a certificate of assured water supply, it is a precursor to, and a necessary requirement for obtaining a certificate. Therefore, the Company submits that the PAD, and the Company's diligent pursuit of its approval, as documented by Attachments 7 and 8, constitutes substantial compliance with the Decision's requirement of this post-decision condition, particularly in view of the other matters presented herein in support of the Company's request.

d. As discussed in paragraphs 13 and 14, above, and as the Commission knows, the development and home-building industries in Pinal County essentially bottomed out in late 2008 bringing development to a near halt (see Attachment 9 hereto, an Economic Synopsis prepped by the Federal Reserve Bank of St. Louis), a fact over which the Company (and many other water and sewer utilities who have compliance obligations and have had to request CCN compliance extension deadlines) and the Commission obviously have no control, but one which did not exist when the Decision was entered; the Company submits that this economic reality should be an important determinant in the Commission acting favorably on the Company's request, as the continued existence of the Company's CCN for the extension area will help to support the now improving development market; conversely, the withdrawal of the CCN would be, the Company submits harmful to the development recovery; indeed the property owner letters attached to this Request confirm the owners' plans to develop their property in reliance on the Company's CCN.

In view of the foregoing, the Company respectfully requests that the compliance deadline under the Decision for Parcels 3, 4, 5 and 7 be extended until March 23, 2012.

RESPECTFULLY SUBMITTED this 2nd day of October 2009.

ARIZONA WATER COMPANY

By: [signature]

Robert W. Geake
Vice President and General Counsel
ARIZONA WATER COMPANY
Post Office Box 29006
Phoenix, Arizona 85038-9006

Original and thirteen (13) copies of the foregoing filed this 2nd day of October 2009 with:

Docket Control Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

A copy of the foregoing was mailed this 2nd day of October 2009 to:

Honorable Lyn A. Farmer
Chief Administrative Law Judge
Hearing Division
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

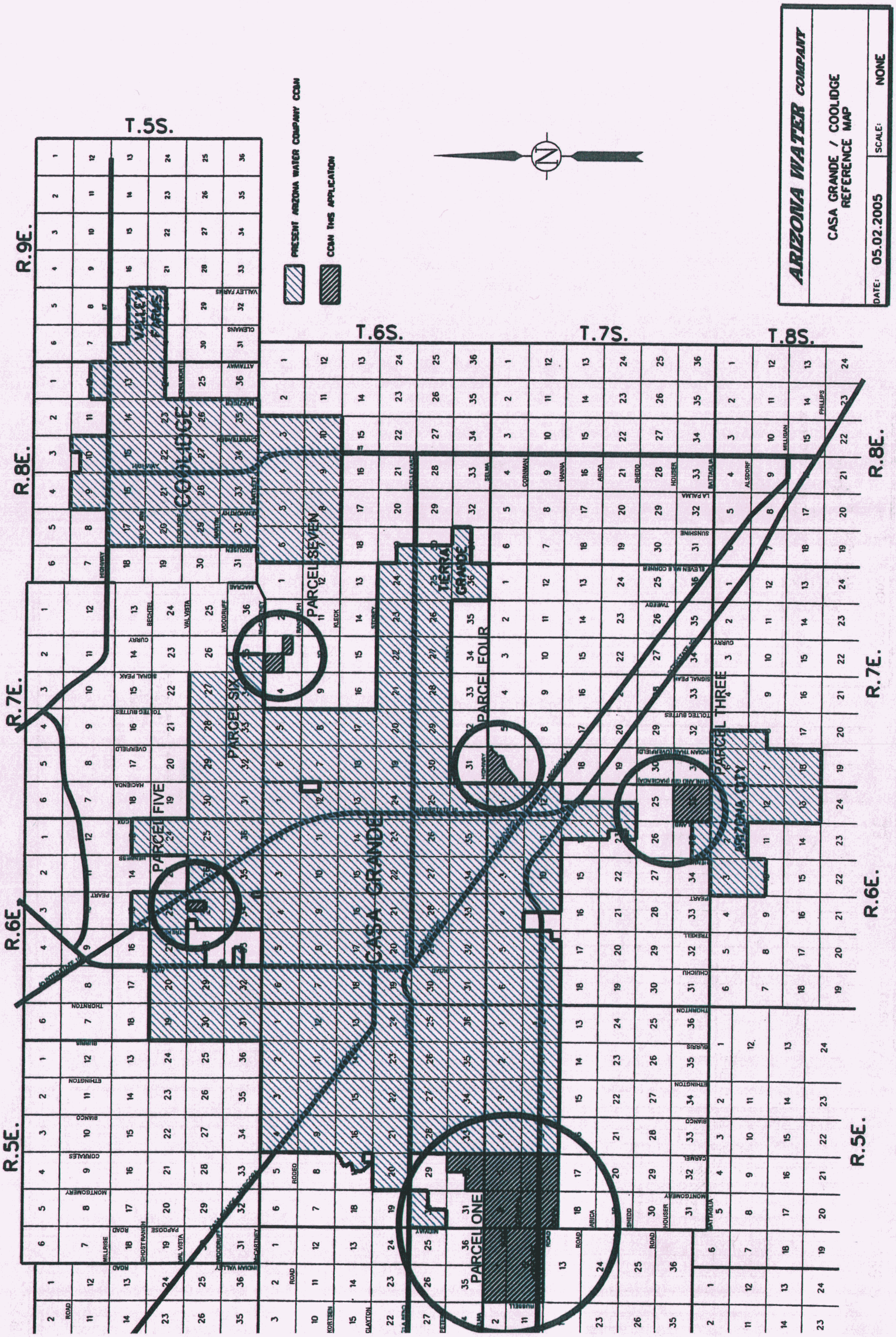
Janice Alward, Chief Counsel
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

Steve Olea
Director, Utilities Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

Brian K. Bozzo
Manager, Compliance and Enforcement
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

By: Robert Geake

ATTACHMENT 1



ATTACHMENT 2

William H. and Jacqueline M. Warren
P.O. Box 111
Arizona City, Arizona 85223

July 20, 2009

Arizona Water Company
Attn: Robert W. Geake
3805 N. Black Canyon Highway
Phoenix, AZ 85015

Dear Mr. Geake:

I am following up with you regarding Pinal County Assessor's Parcel Nos. 511-78-0200, 01A9 and 0187 which are owned by William and Jacqueline M. Warren.

Although our plans for development have been delayed by the severe recession that is still adversely affecting the Pinal County real estate market, we still need and desire to receive water service from Arizona Water Company to serve this parcel.

Our current plans include development within the earliest possible time, considering current market conditions, perhaps within twenty-four months. If market conditions improve, however, we hope to shorten this timeframe.

If you have any questions, please feel free to contact us.

Sincerely,

William H. Warren 7-20-09
William H. Warren
Jacqueline M. Warren Jacqueline M. Warren
7-20-09

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ATTACHMENT 3

Sonoran Ranch Properties, LLC
13529 W. Shore Road
Nine Mile Falls, WA 99026-9379

August 5, 2009

Arizona Water Company
Attn: Robert W. Geake
3805 N. Black Canyon Highway
Phoenix, AZ 85015

Dear Mr. Geake:

We are following up with you regarding Pinal County Assessor's Parcel Nos. 402-06-01201, 402-06-01386, 402-06-01409, 402-06-01904, and 402-06-02407 which are owned by Sonoran Ranch Properties, LLC and managed by 1995 Harr Family Limited Partnership.

Although our plans for development have been delayed by the severe recession that is still adversely affecting the Pinal County real estate market, we still need and desire to receive water service from Arizona Water Company to serve these parcels.

Our current plans include development within the earliest possible time, considering current market conditions, perhaps within twenty-four months. If market conditions improve, however, we hope to shorten this timeframe.

If you have any questions, please feel free to contact us.

Sincerely,

HARR FAMILY LIMITED PARTNERSHIP

By: Judith A. Harr

Its: ~~MHA~~ Authorized Representative

ATTACHMENT 4

DWOP LLC

5040 E. Shea Boulevard, Suite 254
Scottsdale, Arizona 85254

July 28, 2009

Arizona Water Company
Attn: Robert W. Geake
3805 N. Black Canyon Highway
Phoenix, AZ 85015

Dear Mr. Geake:

We are following up with you regarding Pinal County Assessor's Parcel No. 509-44-008B6 which is owned by DWOP LLC.

Although our plans for development have been delayed by the severe recession that is still adversely affecting the Pinal County real estate market, we still need and desire to receive water service from Arizona Water Company to serve this parcel.

Our current plans include development within the earliest possible time, considering current market conditions, perhaps within twenty-four months. If market conditions improve, however, we hope to shorten this timeframe.

If you have any questions, please feel free to contact us.

Sincerely,

By: ____________________
DWOP LLC

Its: MANAGER

ATTACHMENT 5

51 Buckeye Limited Partnership
5816 N. Casa Blanca Drive
Paradise Valley, Arizona 85253

July 24, 2009

Arizona Water Company
Attn: Robert W. Geake
3805 N. Black Canyon Highway
Phoenix, AZ 85015

Dear Mr. Geake:

We are following up with you regarding Pinal County Assessor's Parcel No. 509-44-00206 which is owned by 51 Buckeye Limited Partnership.

Although our plans for development have been delayed by the severe recession that is still adversely affecting the Pinal County real estate market, we still need and desire to receive water service from Arizona Water Company to serve this parcel.

Our current plans include development within the earliest possible time, considering current market conditions, perhaps within twenty-four months. If market conditions improve, however, we hope to shorten this timeframe.

If you have any questions, please feel free to contact us.

Sincerely,
51 BUCKEYE LIMITED PARTNERSHIP
By 51 BUCKEYE, INC

By: ____________________
51 Buckeye Limited Partnership
VP

Its: ____________________

RECEIVED
AUG - 3 2009
AZ WATER COMPANY
PHOENIX-LEGAL

First American Title Insurance Company
4801 E. Washington Street, Suite 255
Phoenix, Arizona 85034

July 28 2009

Arizona Water Company
Attn: Robert W. Geake
3805 N. Black Canyon Highway
Phoenix, AZ 85015

Dear Mr. Geake:

We are following up with you regarding Pinal County Assessor's Trust No. 8673; Parcel Nos. 401-01-12805, 401-01-12904, 401-01-13001, 401-01-13209, 401-01-012K8, 401-01-012M2, 401-01-012N4, 401-01-012P8 and 401-01-012R2 which are owned by First American Title Insurance Company.

Although our plans for development have been delayed by the severe recession that is still adversely affecting the Pinal County real estate market, we still need and desire to receive water service from Arizona Water Company to serve these parcels.

Our current plans include development within the earliest possible time, considering current market conditions, perhaps within twenty-four months. If market conditions improve, however, we hope to shorten this timeframe.

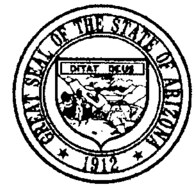
If you have any questions, please feel free to contact us.

Sincerely,

By: Charlotte A. Knoll
FIRST AMERICAN TITLE
INSURANCE COMPANY

a California corporation, as Trustee
Its: under Trust 8673 and not personally
Senior Trust Officer

ARIZONA DEPARTMENT OF WATER RESOURCES
Office of Assured and Adequate Water Supply
2nd Floor, 3550 N. Central Ave, Phoenix, AZ 85012
Telephone 602 771-8585
Fax 602 771-8689



Janet Napolitano
Governor

Herbert R. Guenther
Director

November 20, 2008

Steven W Corell
Clear Creek Associates, LLC
6155 E. Indian School Rd.
Suite 200
Scottsdale AZ, 85251

Re: Application for a Physical Availability Determination
Arizona Water Company - Pinal Valley Water Service Area (DWR No. 51-700444.0000)
Administrative Completeness Review

Dear Mr. Corell:

We received the above referenced application for a Physical Availability Determination (PAD) on November 15, 2007. During our administrative review, we have determined the application to be incomplete and notified you of the incomplete items in a letter dated February 28, 2008. On August 25, 2008, Clear Creek Associates submitted a response to the incomplete items. The response was a supplement to the original model submitted by Arizona Water Company (AWC) on November 15, 2007.

The numeric model as resubmitted by AWC was re-evaluated by the Department of Water Resources Hydrology Division. Compared to the previously submitted AWC model, the revised AWC model has been changed significantly. Some of the significant changes include a revised pumpage distribution among the three model layers, a reconfiguration of model boundaries, a revised distribution of hydraulic parameters and updated recharge properties. The revised AWC model has been reviewed in accordance with *ADWR's Substantive Policy Statement on Hydrologic Guidelines for AWS* signed August 31, 2007. The following is a list of deficiencies that need to be clarified and/or corrected before the review of the application can be completed:

1. Groundwater Underflow and Boundary Conditions

   Groundwater underflow was simulated in the revised AWC model through a combination of general head boundaries, constant flux boundaries and recharge boundaries. The following address the comments regarding each type of boundary condition simulated in the model.

   a) Constant Flux Boundary

      Groundwater underflow from the South Picacho Peak and the Cactus Forest were simulated though constant flux boundaries. In the 100-year projection model, these two groundwater underflow components (i.e. 24,000 AFY (acre-feet per year) in total) were diminished since 2030 (stress period 24, the same number of stress period used in the transient calibration model). The applicant must explain if this is a data input error or provide evidence to support the diminished groundwater underflow of these two areas.

   b) General Head Boundary

      Groundwater underflow through the Florence gap and the gap between the Santan and Sacaton Mountains were simulated through general head boundaries (GHB). However, these two boundaries were only assigned in model layer 3. No GHB boundaries were specified in model layer 1, and only the GHB boundary at the Florence gap was simulated in model layer 2. The applicant must justify the need for the different configurations for the 3 model layers.

c) Recharge Boundary

Groundwater underflow through Santa Rosa, Waterman Wash, the north Picacho Peak and the Maricopa Stanfield gap were simulated through recharge boundaries. In other words, all the underflow were applied to model layer 1, and these volume could potentially percolate down to other layers when the vertical conductance is adequate or when layer 1 becomes dry. The use of recharge boundary to simulate underflow through the Maricopa Stanfield gap is not appropriate. In this area, significant vertical hydraulic heterogeneity is exhibited. Hydraulic conductivity in layer 1 (varies from 50 ft/day to 100 ft/day) is significantly larger than that of layer 2 which ranges from 3 ft/day to 5 ft/day. When the underflow volume of 29,450 AFY was applied to layer 1, water tends to flow more quickly in the horizontal direction in layer 1 rather than to percolate down to layer 2 or 3 due to the existence of the thick fine grained layer 2. As a result, the model simulated a significant vertical gradient between layer 1 and layers 2 and 3, and the head difference between layer 1 and layers of 2 and 3 could be more than 350 ft (see Figure 1 attached). The ADWR recommends the use of a specified flux boundary which assigns appropriate amount of underflow to each layer. This method is considered to be a more appropriate way to simulate this underflow.

The revised AWC modeling report mentioned that the groundwater underflow of 3,700 AFY through the Aguirre Valley was simulated through a recharge boundary. Review of modeling files indicated that this recharge component was not simulated in the model. The applicant is required to explain the missing underflow component.

2. Recharge

a) Total Recharge

Total recharge simulated in the revised model was compared to those simulated in the previously submitted AWC model. Among all the recharge components, only the agricultural recharge component was changed significantly to account for the effect of the lagged agricultural recharge. The table below (Table 1) compares the difference on the total recharge estimated between the revised and the previously submitted AWC models.

According to this table, the total recharge simulated in the revised model is about 1.4 to 1.7 times of that simulated in the previous model. The ratio of the total simulated recharge in the revised model over the conceptual total recharge reported in the previous model varies from 1.4 to 2.0. These comparisons show that recharge has been increased significantly in the revised model.

Table 1. Recharge Comparisons

Year	Conceptual	Old Model	Revised Model	Revised/Old	Revised/Conceptual
1985	483,086	512,655	713,473	1.4	1.5
1988	345,317	381,610	569,966	1.5	1.7
1998	282,492	324,569	565,172	1.7	2.0
2003	247,838	244,646	343,386	1.4	1.4

Note. All the recharge volume is in the unit of AFY

b) Agricultural Recharge

By accounting for the impact of the agricultural recharge lag time, which is assumed to be 20 years in the revised modeling report, the agricultural recharge was increased significantly. The agriculture recharge simulated in the revised model ranges from 261,707 AFY to 574,053 AFY. When the lag time is not considered, the conceptual agricultural recharge reported in the previous AWC modeling report ranges from 204,717 AFY to 377,129 AFY. The maximum increase of agriculture recharge was as much as 301,126 AFY in 1993. Initial estimate of the agricultural recharge by considering a 20 year lag time ranges from 198,000 AFY and 468,400 AFY. The calibrated agricultural recharge exceeds the initial estimate for all the years of the transient model (1984~2007). The agricultural recharge was over simulated and must be re-conceptualized.

A constant agricultural recharge was simulated for SCIDD, CAIDD, MSIDD, and HOHOKAM from early 1980s to 1998. After 1998, the estimated agricultural recharge for each of the irrigation districts started to fluctuate. The applicant is required to include discussions in the report to address this temporal recharge distribution (see Figure 2).

c) Gila River Recharge

The revised modeling report indicates that the Gila River recharge was simulated at the median value of 7,450 AFY for the 100-year projection. However, analysis of the modeling files indicates that this recharge was actually simulated at a value of 4,995 AFY. The applicant must correct this discrepancy.

d) Waterman Wash and South Picacho Peak Recharge

Table 9 in the AWC report presents the 100-year (2107) modeled recharge volume. The 100-year recharge volume was also calculated based on modeling input. Comparisons of the two indicate some discrepancies. Specifically, the Waterman Wash recharge and the recharge through the S. Picacho Peak were reported to be 749 AFY and 311 AFY, respectively. Based on modeling input, zero recharge was simulated at the S. Picacho Peak, and 612 AFY recharge were simulated at the Waterman Wash. The applicant must correct this discrepancy.

3. Hydraulic Conductivities

a) The report referenced USGS's (Pool and Other's) estimate of hydraulic conductivities in the Eloy sub-basin, and they range from 30 ft/day to 100 ft/day. The model calibrated UAU and LCU hydraulic conductivities, however, range from 8 ft /day to 30 ft/day for majority of the Eloy sub-basin, except for along the Gila River area, where a high k of 175 ft/day was calibrated. In general, the hydraulic conductivity appeared lower than estimated by Pool and others.

b) Due to the lack of sufficient pumping test data, the revised AWC model calibration relied on specific capacity data for wells in the area. In areas where both specific capacity data and pumping test data are available, the conductivity estimate based on well specific capacity data tends to be lower than that estimated by aquifer pumping tests. Please provide a narrative on the reliability of using specific capacity data for estimation of hydraulic conductivity values used in the model.

c) Concerning the analysis of an aquifer test in D-05-03 26ACC. Hydrology re-analyzed both the "constant rate" and recovery data for the tested well. Our analysis shows an average K-value of 14 ft/d. The K-values determined by ADWR are estimated by dividing the transmissivity value by the full saturated thickness of the well [depth of completed well (418 ft.) – static water level (128 ft.) = 290 ft]. It may be that the applicant is using the screened interval (200 ft) to estimate the K-value. This would account for their higher estimated values. The transmissivity value obtained from the results of an aquifer test should best represent the saturated thickness of the completed well and should not be just limited to the screened interval.

It is important to note that while the test is presented as a "constant rate" test, the plot of the drawdown curve clearly shows the test more closely resembles a "step-test".

Finally, it is also important to note that after 24 hours, the well had not fully recovered. The maximum drawdown after 24 hours was 109 ft. However, after 24 hours of recovery, the water level had only risen 99 feet.

4. Calibration Residuals

Calibration residuals for the selected calibration years were summarized in Table 2 below. As shown in the table, the mean residual errors in Layer 1 for all the selected calibration years are negative values, indicating that water level at observation wells are under simulated. On the contrary, all the mean residual errors in layer 2 are positive values, indicating that water level are over simulated. Water levels in layer 3 are mostly over simulated except for 2003 when they are largely under simulated. The residual error patterns suggest the need of additional model calibration effort.

The layer specific water budget usually provides useful information on how groundwater interacts among different layers. The layer specific water budgets for selected calibration years were summarized in Table 3 below. As indicated in Table 3 below, the dominant inflow component is recharge, and recharge is primarily applied to layer 1. Even with the significantly increased agricultural recharge, layer 1 water levels were shown to be apparently under simulated. In layer 2 and 3 where much less recharge was simulated, water levels were shown to be over simulated. The residual error pattern also suggests the possible presence of model errors on hydraulic parameters including the distribution of hydraulic conductivity and vertical conductance.

The residual error patterns noted above must be carefully examined and related to the overall effect that they have on the results on the model.

Table 2 – Calibration Results per Layer as Calculated by the ADWR

Year	Layer 1			Layer 2			Layer3			All Layers		
	# of wells	*ME*	MAE	*# of wells*	*ME*	MAE	*# of wells*	*ME*	MAE	*# of wells*	*ME*	MAE
1985	59	***-14.8***	**24.5**	15	***24.9***	**37.3**	17	***6.3***	**24.9**	91	***-4.3***	**26.7**
1988	56	***-16.7***	**33.4**	43	***50.1***	**61.9**	17	***11.2***	**26.7**	116	***12.2***	**43.0**
1998	51	***-27.9***	**51.9**	38	***19.9***	**40.9**	18	***1.3***	**35.1**	107	***-6***	**45.2**
2003	46	***-29.3***	**51.5**	29	***10.8***	**38.7**	13	***-20.6***	**41.9**	88	***-14.8***	**45.8**

ME = Mean residual error; MAE =Mean Absolute Residual Error

Table 3 – Layer Specific Water Budgets as Calculated by the ADWR

Layer Specific Budget	**1985**			**1998**		
Inflow Components	**Layer 1**	**Layer 2**	**Layer 3**	**Layer 1**	**Layer 2**	**Layer 3**
Storage	112,075	10,307	101,087	37,600	62	8,226
Top	-	314,529	148,426	-	247,977	120,829
Bottom	23,400	30,325	-	13,853	17,432	-
Constant Head	-	-	-	-	-	-
Wells	8,601	141	13,046	8,893	144	13,130
Recharge	614,880	15,496	80,435	470,145	13,293	79,072
GHB	28	-	21	-	-	-
Subtotal	***758,985***	***370,798***	***343,014***	***530,491***	***278,908***	***221,257***
Outflow Components						
Storage	293,907	43,713	62,919	175,512	33,390	45,361
Top	-	23,400	30,325	-	13,853	17,432
Bottom	314,529	148,426	-	247,977	120,829	-
Constant Head	-	-	-	-	-	-
Wells	149,412	155,246	240,966	102,310	110,823	136,471
GHB	1,128	-	8,783	4,683	-	22,007
Subtotal	***758,976***	***370,785***	***342,994***	***530,483***	***278,895***	***221,271***

5. Observed vs. Model Simulated Water Elevation Contours

   In 2003, the model simulated groundwater elevation contours are significantly different from the observed ones, especially in Maricopa Stanfield sub-basin, where the difference could be as much as 250 ft. The applicant must address the error within the model calibration or re-conceptualization.

6. Inactive Section of Layer 3

   In the central Eloy sub-basin, due to the large thickness of layer 2 and 3, the bottom of the model exceeds 3,000 ft. As a result, layer 3 in this area was determined to be inactive in the revised AWC model. The layer 3 thickness in the area could be as much as 2,000 ft. The extent and the location of the inactive portion of the model could potentially distort the groundwater flow direction in this area. A recommended alternative method would be to simulate the layer 3 in this area through a thin layer (50 ft or 100 ft in thickness) with fudged conductivity values to maintain the realistic transmissivity values in this area.

7. Sensitivity Analysis

   The report includes a table summarizing the model sensitivity results with regard to hydraulic parameters of conductivity, specific storage and specific yield. As shown in this table, the model is most sensitive to the reduced values of specific yield, and relatively sensitive to hydraulic conductivity, and generally insensitive to changes in specific storage. Since the sensitivity results were evaluated by comparison of the sum of the squared residuals to the transient calibrations, the lack of calibration targets in layer 2 and 3 especially in the area where thick clay layer exits could partially skew the conclusions regarding the model's insensitivity to changes on specific storage.

   Due to the lack of details, it is not clear how the sensitivity analysis was performed. Since each hydraulic parameter tested (i.e. conductivity, specific yield, and specific storage) has many zones in different model layers, it is not clear if one zone of each parameter was tested or all the zones of each parameter were tested simultaneously. The applicant must provide greater detail of how the sensitivity analysis was performed.

8. Rewetting Function

   The rewetting function is not activated in the revised AWC model. As groundwater levels in Pinal AMA have been observed to recover rapidly since 1980s due to the use of CAP water and accordingly reduced groundwater pumpage. The activation of the rewetting function in the MODFLOW could, in theory, help to better simulate groundwater conditions in Pinal AMA. It is understood that the rewetting function might not work as well as expected some times; however, the applicant must include a discussion of this function in the report.

9. General Concerns

   a) The AWC updated total committed demand volume for Maricopa-Stanfield sub-basin is acceptable. The CCA response states that Tables 14 and 15 summarize the (non-AWC) current and committed water demand simulated in the model and include well locations for the Maricopa-Stanfield and Eloy sub-basins. However, the attached tables in the response did not reflect this revised information and must be updated with the correct demand values and well locations.

   b) There is a groundwater pumping deficit of around 60,000 af/yr simulated in the model versus the pumping volume the Department estimates should be in the model. The deficit appears to be due to the non-inclusion of Indian (SCIP and GRIC) pumping and a volume of long-term storage credits (LTSC) that are too low. However, the deficit may also be caused by model cells dewatering that contain projected pumpage. The defect remains fairly steady to around 2020 and then starts growing to a high of around 117,000 af/yr in 2057. Due to the removal of LTSC, the deficit drops to around 85,000 af/yr and remains at this volume to 2107. Overall, the volume simulated in the model is ~8.8 million acre-feet short of what was projected by ADWR (60,095,147 simulated vs. 69,918,698 projected). This must be addressed by the applicant.

   c) Based on recognition that there is a significant pumping deficit in the model it is not possible to determine at this time whether there will be projected negative impacts (dewatering of projected Assured Water Supply (AWS) groundwater withdrawal locations or projected 100-year depths to static water that exceed 1,100 feet) for holders of issued AWS certificates, designations or analyses in the model area. Once the deficit pumping issues are suitably addressed it will be necessary for the applicant to determine if negative impacts are projected for any issued AWS permit holders, and if so, modify the projected 100-year AWC groundwater demands to mitigate any such potential negative impacts.

Please submit the requested information to the Office of Assured Water Supply within 60 days of this notice. Our review of your application has stopped and will resume when we receive the missing items. If you do not respond to this letter within the 60-day time frame, the director of the Department may take action to deny the application and close the file.

If you have any questions regarding the contents of this letter or the application in general, please do not hesitate to contact Norma Coupaud at (602) 771-8598.

Sincerely,

John Schneeman, Manager
Office of Assured and Adequate Water Supply

JFS/njc

cc: Bill Garfield, Arizona Water Company
Drew Swieczkowski, ADWR Hydrology
Sandra Fabritz-Whitney, ADWR Water Management

Attachments

Table 4 – Simulated Water Budget Comparison between Previous and Resubmitted AWC Model

AWC model 082608	1	2	5	10	15	20	24
	1984	**1985**	**1988**	**1993**	**1998**	**2003**	**2007**
Inflow Components							
Storage	384,127	224,593	126,023	21,725	46,212	184,729	135,361
Constant Head	-	-	-		-	-	-
Wells	22,277	21,788	21,843	22,114	22,167	22,522	22,522
Recharge	752,407	713,473	569,966	1,169,464	565,172	343,386	325,252
GHB	787	49	-	-			
Subtotal	***1,159,598***	***959,904***	***717,832***	***1,213,303***	***633,551***	***550,637***	***483,135***
Outflow Components							
Storage	613,697	403,468	228,359	979,779	256,747	86,783	83,350
Constant Head	-	-	-		-	-	-
Wells	539,546	546,490	478,475	205,486	349,604	441,843	381,630
GHB	6,381	9,913	10,999	27,959	26,744	22,008	18,166
Subtotal	***1,159,623***	***959,870***	***717,833***	***1,213,225***	***633,096***	***550,634***	***483,147***
total in flow	775,471	735,311	591,809	1,191,578	587,339	365,908	347,774
old model	1	2	5	10	15	20	24
Inflow Components	**1984**	**1985**	**1988**	**1993**	**1998**	**2003**	**2007**
Storage	554,458	414035.6552	297015.9513	91536.31049	143846.8184	239297.5947	210594.2075
Constant Head	-	-	-		-	-	-
Wells	-	-	-		-	-	-
Recharge	472,478	512,655	381,610	882,696	324,569	244,646	264,090
GHB	52,569	53,498	60,922	62,870	68,543	71,006	71,218
Subtotal	-		-				
Outflow Components	***1,079,505***	***980,188***	***739,548***	***1,037,103***	***536,959***	***554,950***	***545,903***
Storage	530,686	420,342	251,122	804,789	167,338	103,382	79,342
Constant Head	-	-					
Wells	541,425	549,215	478,179	206,330	351,119	438,865	457,960
GHB	7,406	10,631	10,251	25,954	18,486	12,715	8,656
Subtotal	***1,079,517***	***980,187***	***739,551***	***1,037,072***	***536,942***	***554,962***	***545,958***
total inflow	525,047	566,153	442,532	945,566	393,112	315,653	335,309

Figure 1 – Simulated Northwest Boundary per Model Layer

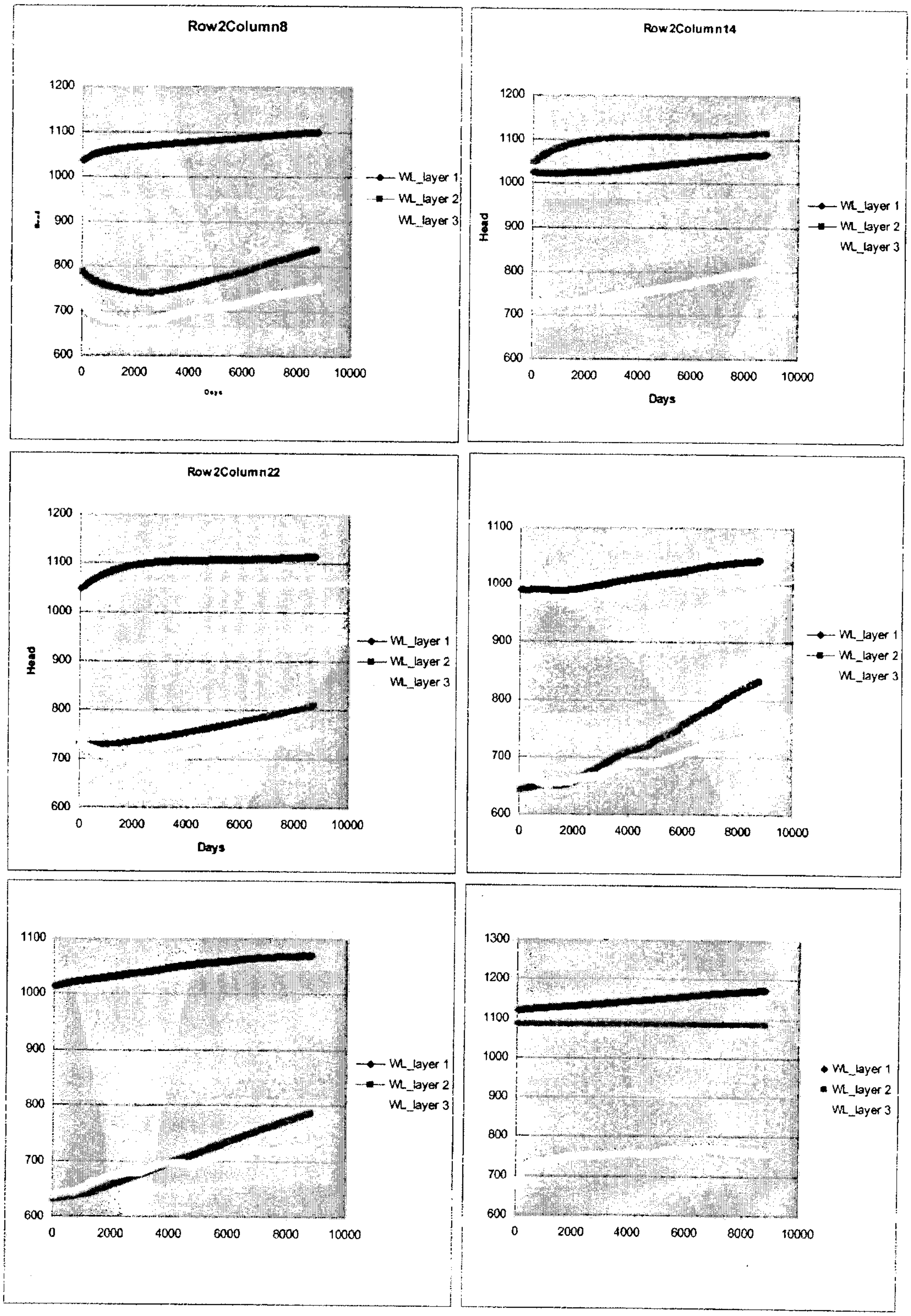
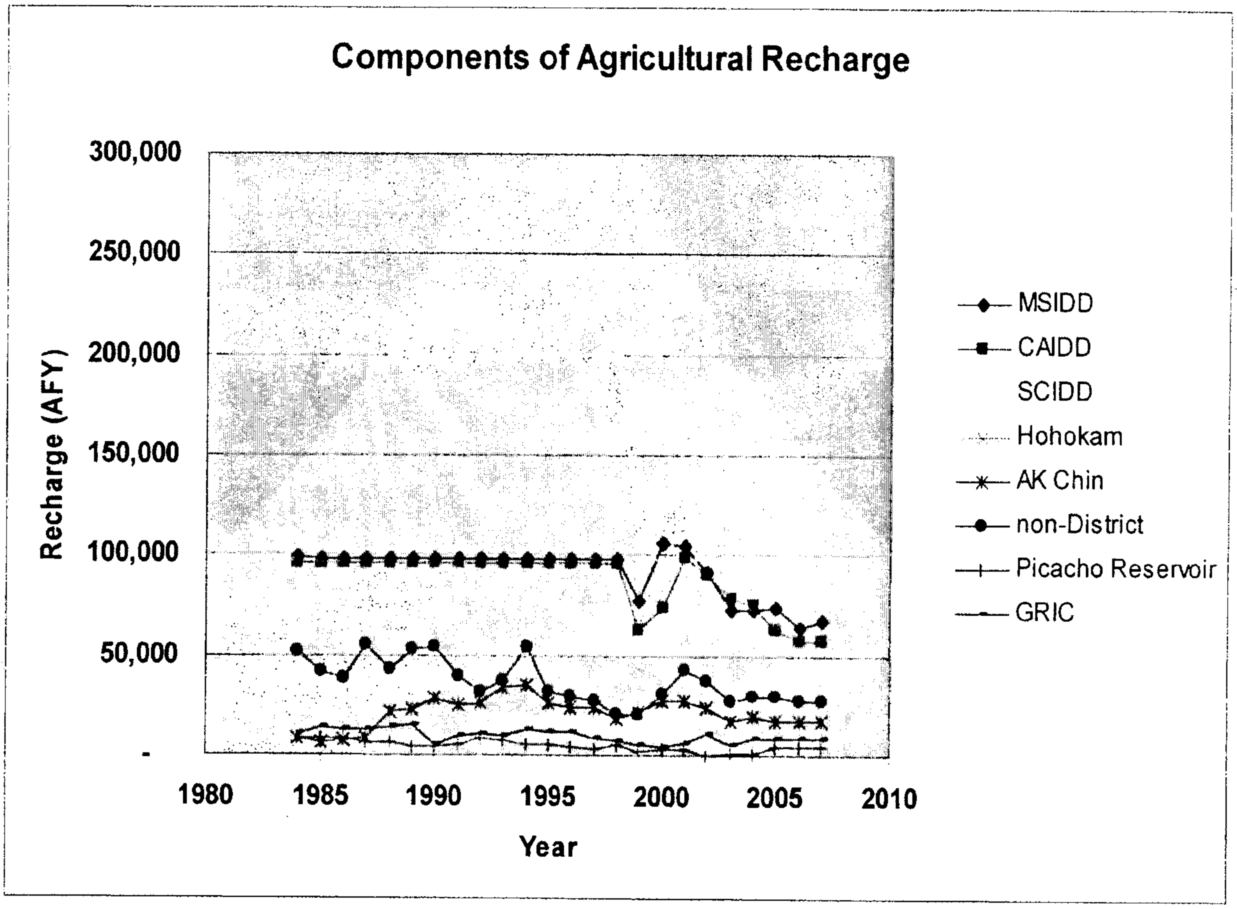


Figure 2 – Components of Agricultural Recharge within re-submitted AWC Model



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April 22, 2009

Mr. John Schneeman, Manager
Arizona Department of Water Résources/Assured and Adequate Water Supply
3550 N. Central Avenue
Phoenix, Arizona 85007

DRAFT Response to Administrative Completeness Review (dated November 20, 2008)
Application for a Physical Availability Demonstration Item Nos. 3 to 8
Arizona Water Company - - Pinal Valley Water Service Area (ADWR File No. 51-700444.0000)

Dear Mr. Schneeman:

This draft letter has been prepared by Clear Creek Associates, PLC (CCA) on behalf of Arizona Water Company in response to the Administrative Completeness Review letter (completeness review letter) from the Arizona Department of Water Resources (ADWR) dated November 20, 2008, for the Pinal Valley Water Service Area (PVWSA) Application for Physical Availability Demonstration (PAD, ADWR File No. 51-700444.0000). The completeness review letter was discussed in meetings with Department staff held on December 16, 2008 and March 6, 2009. As discussed in our March 6, 2009 meeting with Department staff we will be submitting a series of draft responses to the points outlined in the Departments November 20, 2008 letter, and include necessary supporting attachments. This draft letter responds to item numbers 3 to 8 as presented in the Departments letter. The comments presented in the subject letter are presented below in italics followed by our response.

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3) Hydraulic Conductivities

a) *The report referenced USGS (Pool and others) estimate of hydraulic conductivities in the Eloy sub-basin, and they range from 30 ft/day to 100 ft/day. The model calibrated UAU and LCU hydraulic conductivities, however, range from 8 ft/day to 30 ft/day for majority of the Eloy sub-basin, except for along the Gila River area, where a high k of 175 ft/day was calibrated. In general, the hydraulic conductivity appeared lower than estimated by Pool and others.*

Response: The revised AWC model currently has hydraulic conductivity values in the Upper Alluvial Unit (model layer 1) that range from 10 to 175 ft/d. Pool and others (2001[1]) indicated that the hydraulic conductivity for most of the alluvial facies of the upper unit ranges from 30 to 60 ft/d with the lower range of values occurring in fine-grained sediments southwest of Eloy and south of Coolidge. Higher values of 70 to 100 ft/d are associated with coarse-grained sediments along the Gila River, south of the Casa Grande Mountains, east of Eloy, and between the Silverbell Mountains and Picacho Peak (Pool and others, 2001). USGS estimates were developed based on a relation of hydraulic conductivity to grain size. Figure 1 illustrates the current modeled hydraulic conductivity values of the UAU (Layer 1) with posted aquifer test data and specific capacity data.

The revised AWC model currently has hydraulic conductivity values in the Middle Silt and Clay Unit (model layer 2) that range from 5 to 20 ft/d. The playa facies of the middle unit is predominantly fine-grained – less than 20 percent sand and gravel – but is more dense and less porous than similar sediments in the upper unit; therefore, values of hydraulic conductivity probably are less than 20 ft/d (Pool and others, 2001). Figure 2 illustrates the current modeled hydraulic conductivity values of the MSCU (Layer 2) with posted aquifer test data and specific capacity data.

The revised AWC Model has hydraulic conductivity values in the Lower Conglomerate Unit (model layer 3) that range from 2 to 20 ft/d. The playa facies of the lower unit is more dense and less porous than the middle unit; therefore, lower values of hydraulic conductivity are likely (Pool and others, 2001). The conglomerate of the lower unit is similar to conglomerate found in the western part of the Salt River Valley, which has hydraulic-conductivity values of about 10 ft/d (Brown and Pool, 1989). Higher values of modeled hydraulic conductivity in the Maricopa-Stanfield sub-basin are based on aquifer test data. Figure 3 illustrates the current modeled

[1] Pool, D.R., Carruth, R.L., and Meehan, W.D., 2001. Hydrogeology of Picacho Basin, South-Central Arizona. USGS Water Resources Investigations Report 00-4277.

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hydraulic conductivity values of the LAU (Layer 3) with posted aquifer test data and specific capacity data.

b) *Due to the lack of sufficient pumping test data, the revised AWC model calibration relied on specific capacity data for wells in the area. In areas where both specific capacity data and pumping test data are available, the conductivity estimate based on well specific capacity data tends to be lower than that estimated by aquifer pumping tests. Please provide a narrative on the reliability of using specific capacity data for estimation of hydraulic conductivity values used in the model.*

Response: For the revised AWC model, hydraulic conductivity values were calculated from specific capacity data obtained from ADWR and AWC. Specific capacity is calculated by dividing the pumping rate by the drawdown. If specific capacity data is constant except for the time variation, it is roughly proportional to the transmissivity of the aquifer (Lohman and others, 1972[2]). Values of transmissivity calculated from specific capacity data were based on the following relationship (Driscoll, 1986[3]):

$$Q/s = T/2000$$

Where:

Q = well yield (gpm)
s = well drawdown (ft)
T = transmissivity (gpd/ft)

Among the factors that affect the transmissivity calculation from specific capacity data are the accuracy with which the thickness of the zone supplying water to the well can be estimated, the magnitude of the well loss in comparison with drawdown in the aquifer, and the difference between the "nominal" radius of the well and its effective radius (Heath, R.C., 1983[4]).

Relative to these factors, the common practice is to assume that the value of transmissivity estimated from specific capacity applies only to the screened zone. To apply this value to the entire aquifer, the transmissivity is divided by the length of screen (to determine the hydraulic

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[2] Lohman, S.W., and others, 1972. Definitions of Selected Ground-Water Terms-Revisions and Conceptual Refinements, USGS Water Supply Paper 1988.

[3] Driscoll, F.G., 1986. Groundwater and Wells, Johnson Division, St. Paul, MN, 1098 p.

[4] Heath, R.C., 1983. Basic Ground-Water Hydrology. U.S. Geological Water Supply Paper 2220

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conductivity value), and the result is multiplied by the entire thickness of the aquifer. The value of transmissivity determined by this method is too large (Heath, R.C.);

- If the zone supplying water to the well is thicker than the length of screen, or
- If the effective radius of the well is larger than the "nominal" radius (Heath, R.C., 1983)

The transmissivity based on specific capacity will be too small if a significant part of the drawdown in the pumping well is due to well loss (Heath, R.C., 1983). Figures 1 to 3 generally indicate that the hydraulic conductivity estimates calculated from specific capacity data are lower than those obtained from aquifer tests.

c) *Concerning the analysis of an aquifer test in D-05-03 26ACC. Hydrology re-analyzed both the "constant rate" and recovery data for the tested well. Our analysis shows an average K-value of 14 ft/d. The K-values determined by ADWR are estimated by dividing the transmissivity value by the full saturated thickness of the well [depth of completed well (418 ft.) – static water level (128 ft.) = 290 ft]. It may be that the applicant is using the screened interval (200 ft) to estimate the K-value. This would account for their higher estimated values. The transmissivity value obtained from the results of an aquifer test should best represent the saturated thickness of the completed well and should not be just limited to the screened interval.*

It is important to note that while the test is presented as a "constant rate" test, the plot of the drawdown curve clearly shows the test more closely resembles a "step test".

Finally, it is also important to note that after 24 hours, the well had not fully recovered. The maximum drawdown after 24 hours was 109 ft. However, after 24 hours of recovery, the water level had only risen 99 ft.

Response: The updated AWC model currently has a hydraulic conductivity value in this area of 25 ft/d (see Figure 1). A Well Impact Analysis Recharge Well SRR-1, Red River Development, Pinal County (URS 2007[5]) report was obtained from the ADWR Imaged Records for this well (55-213913). A copy of the report is in Appendix B of the August 25, 2008 submittal. The well is constructed with two louvered screen sections: 160 to 240 ft. bgs, and 270 to 390 ft. bgs with a total screen length of 200 feet. The 24-hour constant rate aquifer test was conducted from February 19-20, 2007 at an average rate of about 225 gpm. A static water level of 127.65 ft. bgs

[5] URS November 19, 2007. Well Impact Analysis Recharge Well SRR-1, Red River Development, Pinal County, Arizona. Prepared for TOUSA Homes Inc.

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was recorded prior to starting the test. A pumping water level of 237.78 ft. bgs was recorded at the end of the constant rate test (total drawdown = 110.13 ft). Water level recovery was monitored for 24 hours with an ending recovered depth to water of 138.82 ft. bgs, or about 90 percent recovery from the initial static water level. The Cooper-Jacob plot indicated a transmissivity of about 23,760 gpd/ft (3,176 ft^2/d). Based on water production from the static water level to the bottom of the well (290 ft) results in a hydraulic conductivity value of about 10.95 ft/d. The Theis Recovery plot indicated a transmissivity of about 39,600 gpd/ft (5,294 ft^2/d). Assuming water production from the static water level to the bottom of the well results in a hydraulic conductivity value of 18.25 ft/d. The average hydraulic conductivity is about 14.6 ft/d. The modeled hydraulic conductivity value of 25 ft/d at this location is generally in line with the average hydraulic conductivity value of the tested well (see Figure 1).

4) <u>Calibration Residuals</u>: Calibration residuals for the selected calibration years were summarized in Table 2 below. As shown in the table, the mean residual errors in Layer 1 for all the selected years are negative values, indicating that water levels at observation wells are under simulated. On the contrary, all the mean residual errors in Layer 2 are positive values, indicating that water levels are over simulated. Water levels in Layer 3 are mostly over simulated except for 2003 when they are largely under simulated. The residual error patterns suggest the need of additional model calibration effort.

The layer specific water budget usually provides useful information on how groundwater interacts among different layers. The layer specific water budgets for selected calibration years were summarized in Table 3 below. As indicated in Table 3 below, the dominant inflow component is recharge, and recharge is primarily applied to Layer 1. Even with the significantly increased agricultural recharge, layer 1 water levels were shown to be apparently under simulated. In Layers 2 and 3 where much less recharge was simulated, water levels were shown to be over simulated. The residual error pattern also suggests the possible presence of model errors on hydraulic parameters including the distribution of hydraulic conductivity and vertical conductance.

The residual error patterns noted above must be carefully examined and related to the overall effect that they have on the model.

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Table 2 – Calibration Results per Layer as Calculated by the ADWR

Year	Layer 1			Layer 2			Layer3			All Layers		
	# of wells	ME	MAE	# of wells	ME	MAE	# of wells	ME	MAE	# of wells	ME	MAE
1985	59	-14.8	24.5	15	24.9	37.3	17	6.3	24.9	91	-4.3	26.7
1988	56	-16.7	33.4	43	50.1	61.9	17	11.2	26.7	116	12.2	43.0
1998	51	-27.9	51.9	38	19.9	40.9	18	1.3	35.1	107	-6	45.2
2003	46	-29.3	51.5	29	10.8	38.7	13	-20.6	41.9	88	-14.8	45.8

ME = Mean residual error; MAE =Mean Absolute Residual Error

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Table 3 -- Layer Specific Water Budgets as Calculated by the ADWR

Layer Specific Budget	**1985**			**1998**		
Inflow Components	**Layer 1**	**Layer 2**	**Layer 3**	**Layer 1**	**Layer 2**	**Layer 3**
Storage	112,075	10,307	101,087	37,600	62	8,226
Top	-	314,529	148,426	-	247,977	120,829
Bottom	23,400	30,325	-	13,853	17,432	-
Constant Head	-	-	-	-	-	-
Wells	8,601	141	13,046	8,893	144	13,130
Recharge	614,880	15,496	80,435	470,145	13,293	79,072
GHB	28	-	21	-	-	-
Subtotal	***758,985***	***370,798***	***343,014***	***530,491***	***278,908***	***221,257***
Outflow Components						
Storage	293,907	43,713	62,919	175,512	33,390	45,361
Top	-	23,400	30,325	-	13,853	17,432
Bottom	314,529	148,426	-	247,977	120,829	-
Constant Head	-	-	-	-	-	-
Wells	149,412	155,246	240,966	102,310	110,823	136,471
GHB	1,128	-	8,783	4,683	-	22,007
Subtotal	***758,976***	***370,785***	***342,994***	***530,483***	***278,895***	***221,271***

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Response: The revised AWC model included updates to the model pumping database to include SCIP pumping information provided by ADWR, revisions to model boundary conditions, and revisions to agricultural recharge rates. Calibration residuals for the revised AWC model for selected target calibration years are summarized in the Table 1 below:

Table 1 - - Calibration Results by Layer

Year	Layer 1			Layer 2			Layer 3			All Model Layers		
	# Obs. Wells	ME (ft)	MAE (ft)	# Obs. Wells	ME (ft)	MAE (ft)	# Obs. Wells	ME (ft)	MAE (ft)	# Obs. Wells	ME (ft)	MAE (ft)
1985	56	(-5.9)	24.9	14	(-20.4)	37.3	16	(-8.3)	23.4	85	(-8.9)	26.8
1988	60	(-0.8)	36.7	37	20.5	44.9	18	3.09	34.2	113	5.78	38.6
1998	57	(-11.7)	37.0	32	(-10.2)	35.0	19	(-2.2)	28.6	107	(-9.4)	34.9
2003	51	(-21.4)	36.0	23	(-10.6)	30.6	15	(-12.9)	29.8	89	(-17.2)	33.6
Mean		**(-9.9)**	**33.6**		**(-5.2)**	**37**		**(-5.1)**	**29**		**(-7.4)**	**33.5**
Mean (08/2008 Model)		**(-22.2)**	**40.3**		**26.4**	**44.7**		**(-0.5)**	**32.2**		**(-3.2)**	**40.2**

The table above indicates that water levels in model layer 1 are still under-simulated but not as significantly as the previous version of the model. Water levels in model layers 2 and 3 are slightly under-simulated, however layer 2 is improved in comparison to the previous simulation.

Table 2 below summarizes model statistics for the updated AWC model:

Table 2 - - Summary of Model Statistics

Parameter	Year			
	1985	**1988**	**1998**	**2003**
Number of Observation Points	85	113	107	89
Mean Error (ME)	-8.9 ft.	5.78 ft.	-9.4 ft.	-17.2 ft.
Mean Absolute Error (MAE)	26.8 ft.	38.6 ft.	34.9 ft.	33.6 ft.
Root Mean Squared (RMS)	33.8 ft.	48.6 ft.	42.9 ft.	42.6 ft.
Normalized Root Mean Squared Error (%RMS)	3.66%	5.39%	5.02%	4.9%
Correlation Coefficient (R)	0.99	0.97	0.98	0.98

The table (Table 2) above documents all model statistics comparing target water levels with model simulated levels. Based on these data, an overall root mean square error of 4.74 percent was calculated, which indicates a reasonably good match between model simulated and measured heads, overall. This error rate is consistent with ASTM and locally accepted standards, and is better than the 10 percent RMS error outlined in Spitz and Moreno (1996[6]).

[6] Spitz, K., and Moreno, J., 1996. A Practical Guide to Groundwater and Solute Transport Modeling: John Wiley & Sons, Inc., New York, 461 p.

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Table 3 - - Layer Specific Water Budget, AWC Revised Model

	1985			1998		
	Layer 1	Layer 2	Layer 3	Layer 1	Layer 2	Layer 3
INFLOW						
Storage	151,782	16,269	85,234	72,767	6,514	11,215
Wells	13,239	5,918	31,104	12,664	5,999	30,000
Recharge	676,188	20,259	80,540	469,079	4,843	58,372
Layer 2 to 1	19,186			8,827		
Layer 1 to 2		531,588			461,261	
Layer 3 to 2		41,380			20,673	
Layer 2 to 3			151,824			156,734
Total In	**860,395**	**615,414**	**348,701**	**563,337**	**499,290**	**256,321**
OUTFLOW						
Storage	306,069	152,511	56,984	76,737	74,957	48,174
Wells	22,737	291,899	250,347	25,346	258,768	187,461
Layer 1 to 2	531,588			461,261		
Layer 2 to 1		19,186			8,827	
Layer 2 to 3		151,824			156,734	
Layer 3 to 2			41,380			20,673
Total Out	**860,394**	**615,420**	**348,711**	**563,343**	**499,286**	**256,308**

A layer specific water budget was prepared (Table 3) for years 1985 and 1998. As indicated in Table 3, most of the recharge is still applied to model layer 1 as it is the uppermost active layer throughout much of the model domain. Table 3 illustrates that inflow from model layer 1 to layer 2 has increased significantly which has improved the under simulation observed in layer 2. The overall mean error in model layer 2 has improved by about 21 ft (Table 1).

5) Observed vs. Model Simulated Water Elevation Contours: In 2003, the model simulated groundwater elevation contours are significantly different from the observed ones, especially in the Maricopa Stanfield sub-basin, where the difference could be as much as 250 ft. The applicant must address the error within the model calibration or re-conceptualization.

Response: The 2003 measured water level contours presented on Figures 15 and 16 of the August 2008 submittal are from ADWR HMS #36. The measured water level contours presented in ADWR HMS#36 represent a composite water level as water levels of the upper aquifer and lower aquifer were not broken out separately. The middle confining unit separates the aquifer system into upper and lower aquifer systems (Pool and others 2001). The upper and lower

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aquifer systems are poorly connected hydraulically where the middle confining unit separates the two aquifer systems (Pool and others, 2001). Head differences between the upper and lower aquifers in the Maricopa-Stanfield sub-basin may be as much as 302 feet as observed in wells D-06-04 09DDD1 and D-06-04 09DDD2 (ADWR HMS #36 Hydrograph No. 35). Head differences between the upper and lower aquifers in the Eloy sub-basin may be as much as 122 feet as observed in wells D-09-08 20ADD1 and D-09-08 20ADD2 (ADWR HMS #36 Hydrograph No. 86). To illustrate the current calibration of the revised AWC model residual error maps for 2003 for all model layers are illustrated on Figures 4 to 6. Figure 4 illustrates a minimum residual of -84.7 ft, and a maximum residual of 134.3 ft for model layer 1 in 2003 (mean residual error = -21.4 ft). Figure 5 illustrates a minimum residual of -102.1 ft, and a maximum residual of 56.1 ft for model layer 2 in 2003 (mean residual error = -10.6 ft). Figure 6 illustrates a minimum residual of -86.6 ft, and a maximum residual of 46.1 ft for model layer 3 in 2003 (mean residual error = -12.9 ft).

We do not believe that the model calibration can be further improved. The observed head data is often from wells that may screen more than one aquifer. Because there is a large vertical difference in head established in this basin, head measurement errors will be large and related to the well construction. A 3-layer model will simply not be able to accommodate such large head differences on a well-by-well basis. The overall statistical analysis of calibration indicates the revised AWC model adequately simulates head differences observed in the Eloy and Maricopa-Stanfield sub-basins.

6) <u>Inactive Section of Layer 3</u>: In the central Eloy sub-basin, due to the large thickness of Layers 2 and 3, the bottom of the model exceeds 3,000 ft. As a result, Layer 3 in this area was determined to be inactive in the revised AWC model. The Layer 3 thickness in the area could be as much as 2,000 ft. The extent and the location of the inactive portion of the model could potentially distort the groundwater flow direction in this area. A recommended alternative method would be to simulate the Layer 3 in this area through a thin layer (50 ft or 100 ft in thickness) with fudged conductivity values to maintain the realistic transmissivity values in this area.

<u>Response</u>: Model Layer 3 cells in the central Eloy sub-basin have been converted from inactive to active cells where the bottom of the model exceed 3,000 ft bls. The bottom elevation of model layer 3 was re-imported to the model with a minimum layer thickness of 100 feet. Where model layer 3 is less than about 200 ft. thick in the central Eloy sub-basin the hydraulic conductivity was set to 100 ft/d to "artificially" maintain a transmissivity of about 10,000 ft^2/d (based on an assumed layer thickness of about 2,000 ft.).

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7) <u>Sensitivity Analysis</u>: The report includes a table summarizing the model sensitivity results with regard to hydraulic parameters of conductivity, specific storage and specific yield. As shown in this table, the model is most sensitive to the reduced values of specific yield, and relatively sensitive to hydraulic conductivity, and generally insensitive to changes in specific storage. Since the sensitivity results were evaluated by comparison of the sum of the squared residuals to the transient calibrations, the lack of calibration targets in Layer 2 and 3 especially in the area where thick clay layer exists could partially skew the conclusions regarding the model's insensitivity to changes on specific storage.

Due to the lack of details, it is not clear how the sensitivity analysis was performed. Since each hydraulic parameter tested (i.e. conductivity, specific yield, and specific storage) has many zones in different model layers, it is not clear if one zone of each parameter was tested or all the zones of each parameter were tested simultaneously. The applicant must provide greater detail of how the sensitivity analysis was performed.

<u>Response</u>: The sensitivity analysis of hydraulic conductivity, specific storage, and specific yield presented in the August 2008 submittal was not zone specific. The range of values above and below each selected model parameter for the sensitivity analysis was applied model-wide.

8) <u>Rewetting Function</u>: The rewetting function is not activated in the revised AWC model. As groundwater levels in the Pinal AMA have been observed to recover rapidly since the 1980s due to the use of CAP water and accordingly reduced groundwater pumpage. The activation of the rewetting function in MODFLOW could, in theory, help to better simulate groundwater conditions in the Pinal AMA. It is understood that the rewetting function might not work as well as expected some time; however, the applicant must include a discussion of this function in the report.

<u>Response</u>: The original USGS MODFLOW did not allow cells in unconfined layers to become re-saturated if the head dropped below the bottom elevation of the grid cells during the course of the simulation. Model cells that went dry during the simulation became inactive for the remainder of the simulation. The USGS later revised the Block-Centered-Flow Package (BCF2) to allow re-wetting of dry cells during a transient simulation. Incorporation of the re-wetting function may cause the solution to become more unstable. The revised AWC model has now incorporated the re-wetting function. The re-wetting function is currently set with a wetting method of re-saturating cells from below, and a wetting interval of every 4 iterations.

An electronic copy of revised AWC transient model (1984 – 2007) is included on a CD in Attachment A.

CLEAR
CREEK
ASSOCIATES

If you have any questions regarding any of the information presented in this letter please contact me at 480-659-7131.

Sincerely,

CLEAR CREEK ASSOCIATES, PLC

Steven W. Corell, R.G.
Senior Hydrogeologist

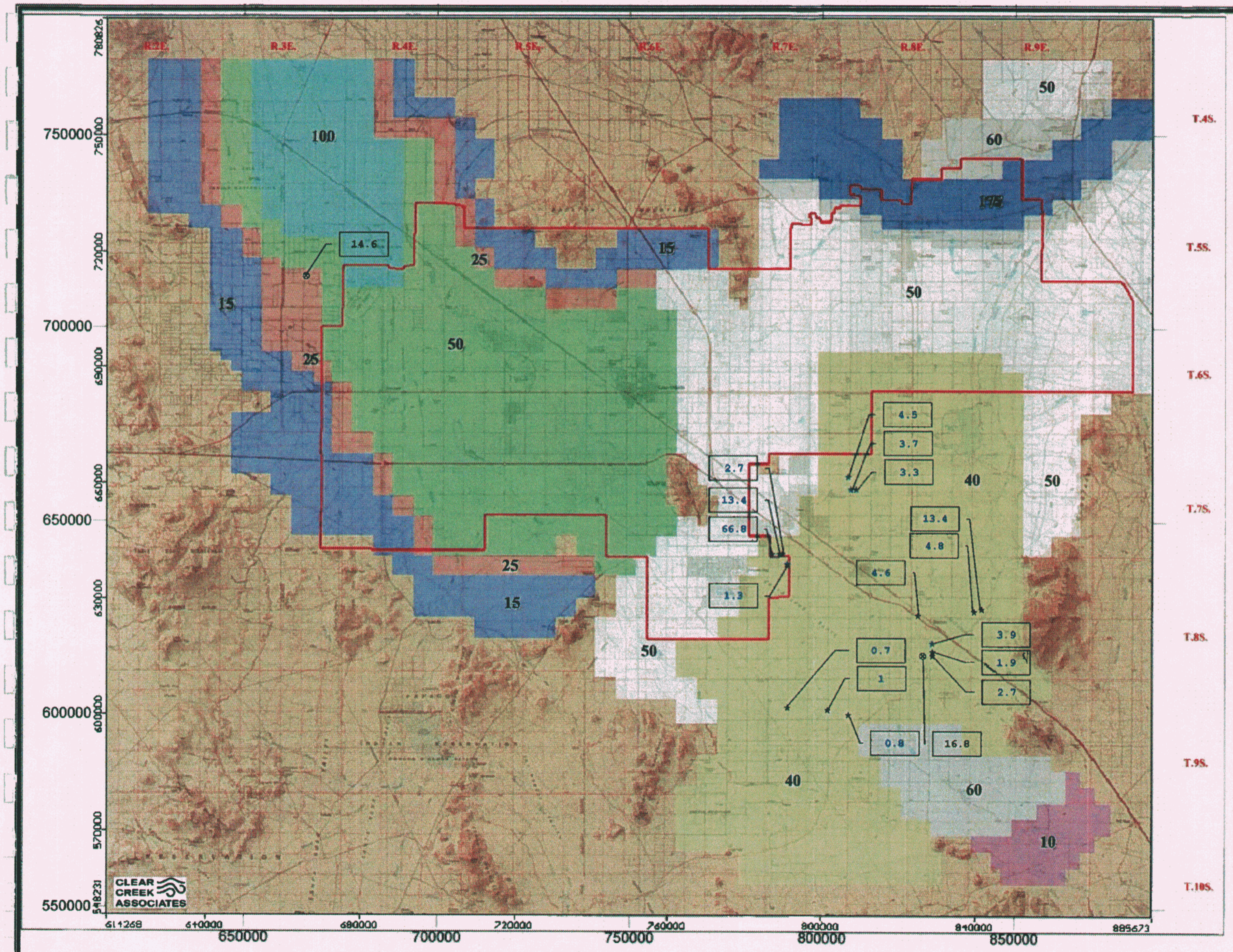
REGISTERED GEOLOGIST
CERTIFICATE NO
30990
STEVE W.
CORELL
Date Signed 04.22.2009
ARIZONA U.S.A.

Expires: 03-31-2012

Attachments

cc: Bill Garfield, Arizona Water Company
Tom Harrell, Arizona Water Company
Doug Bartlett, Clear Creek Associates

FIGURES



21.2 Hydraulic conductivity value (ft/d) determined from aquifer test data (used late-time data when available).

19 Hydraulic conductivity value (ft/d) determined from specific capacity data.

FIGURE 1
UAU MODELED HYDRAULIC CONDUCTIVITY VALUES (ft/d)
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)

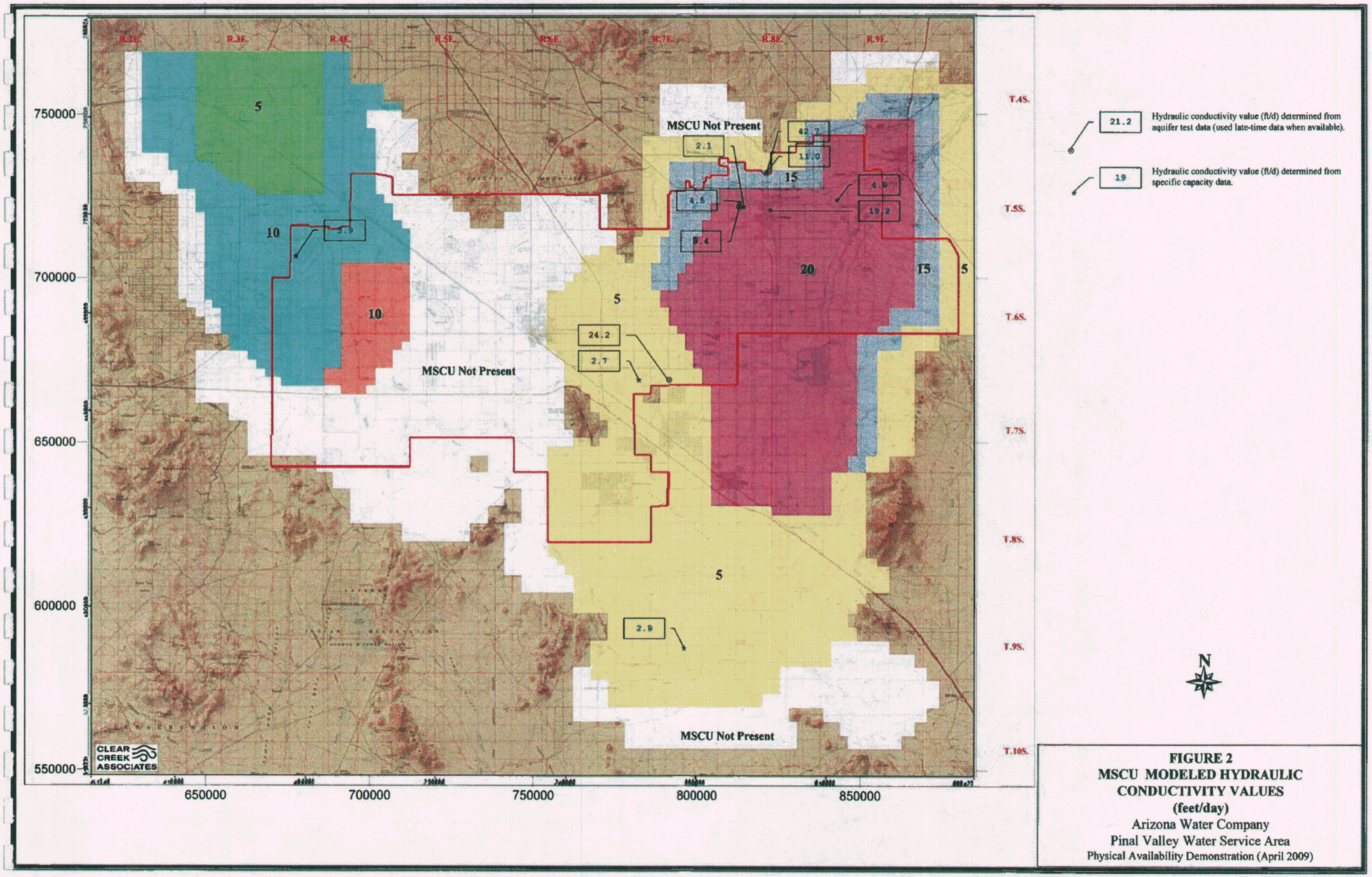
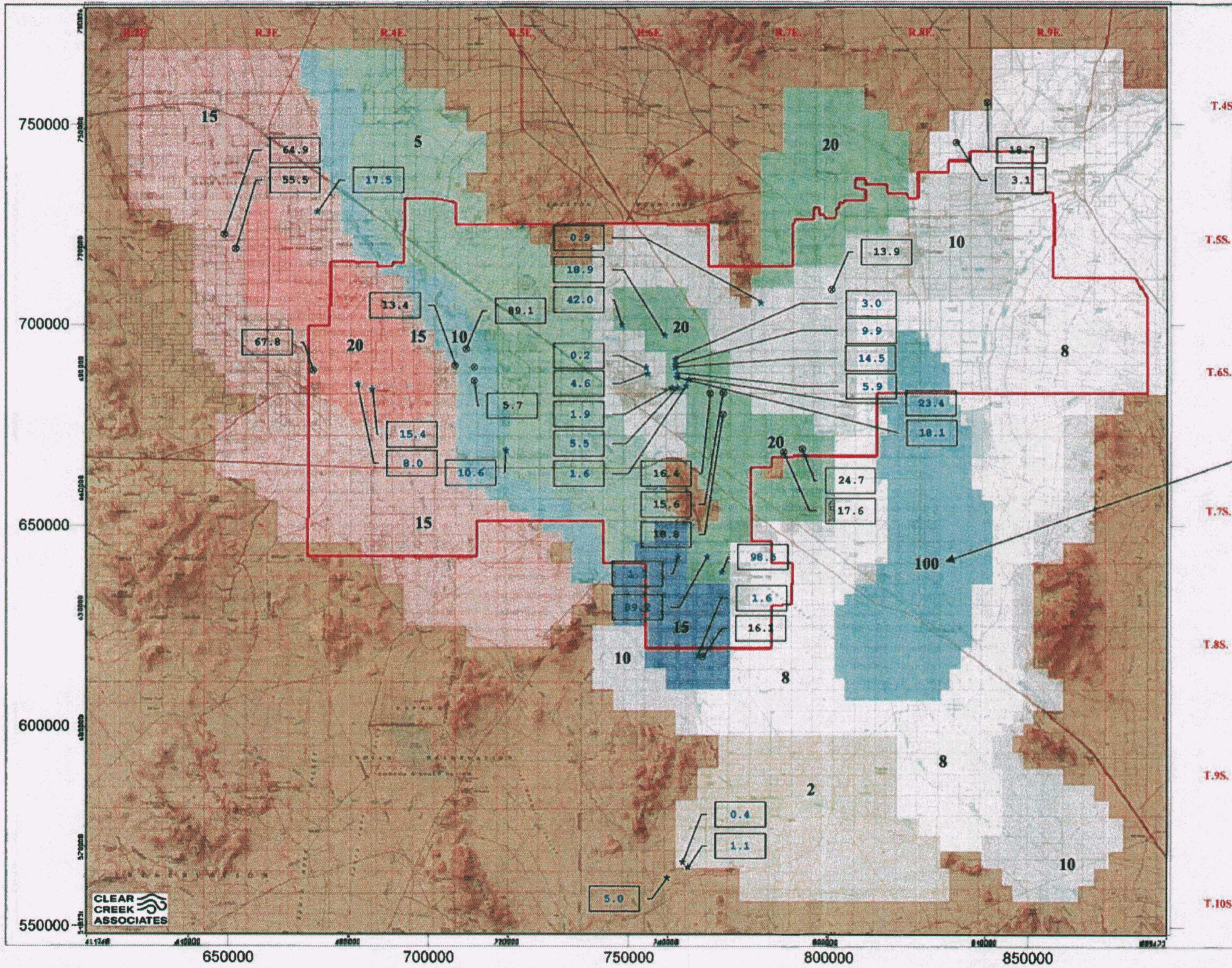


FIGURE 2
MSCU MODELED HYDRAULIC CONDUCTIVITY VALUES
(feet/day)
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)



21.2 — Hydraulic conductivity value (ft/d) determined from aquifer test data (used late-time data when available).

19 — Hydraulic conductivity value (ft/d) determined from specific capacity data.

LCU - - Set to minimum layer thickness of 100 ft where model bottom exceeds 3000 ft bls. Hydraulic conductivity set to 100 ft/d to "artificially" maintain a transmissivity of about 10,000 ft²/d (based on an assumed layer thickness of about 2,000 ft.

N

FIGURE 3
LCU MODELED HYDRAULIC CONDUCTIVITY VALUES
(feet/day)
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)

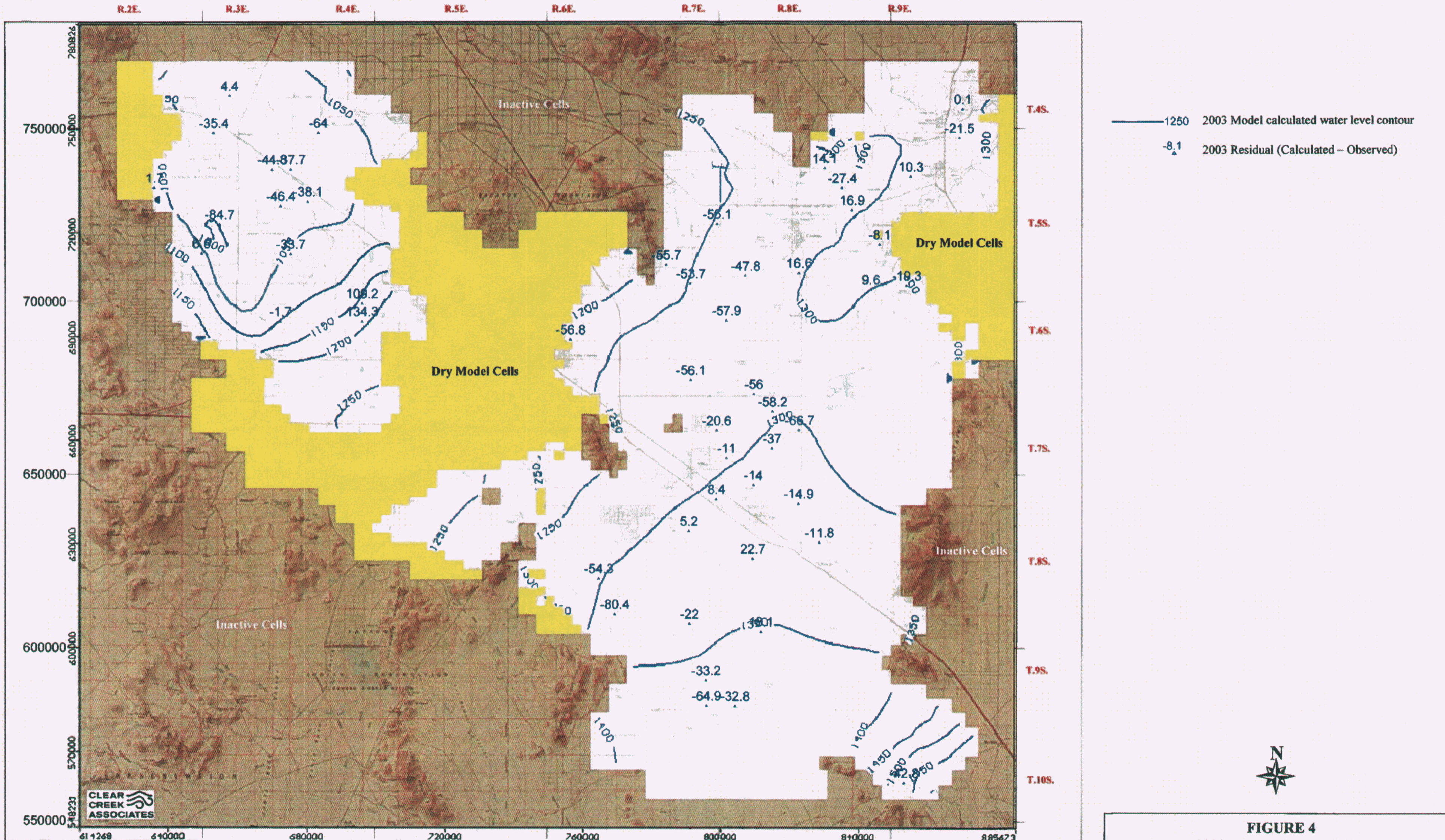
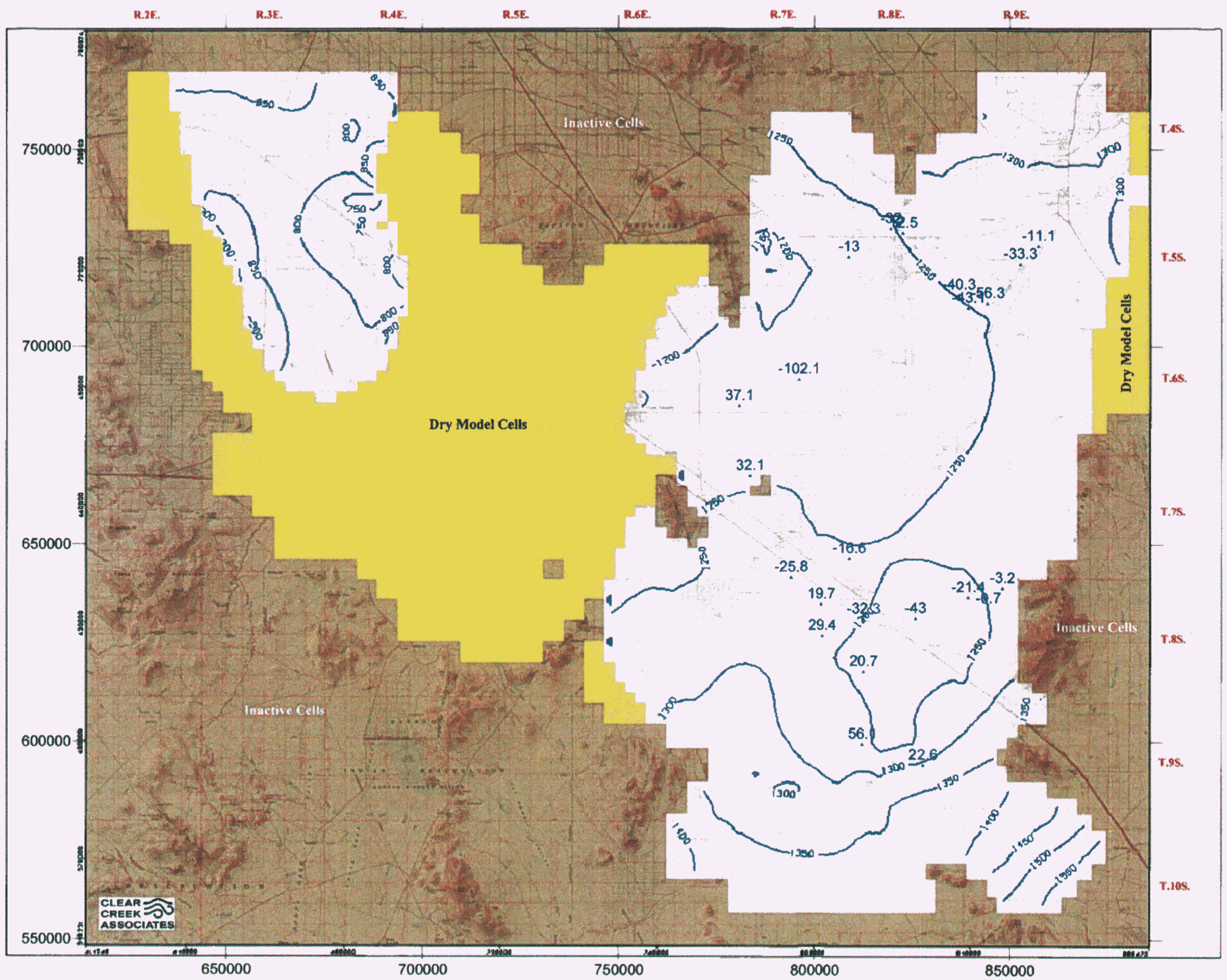


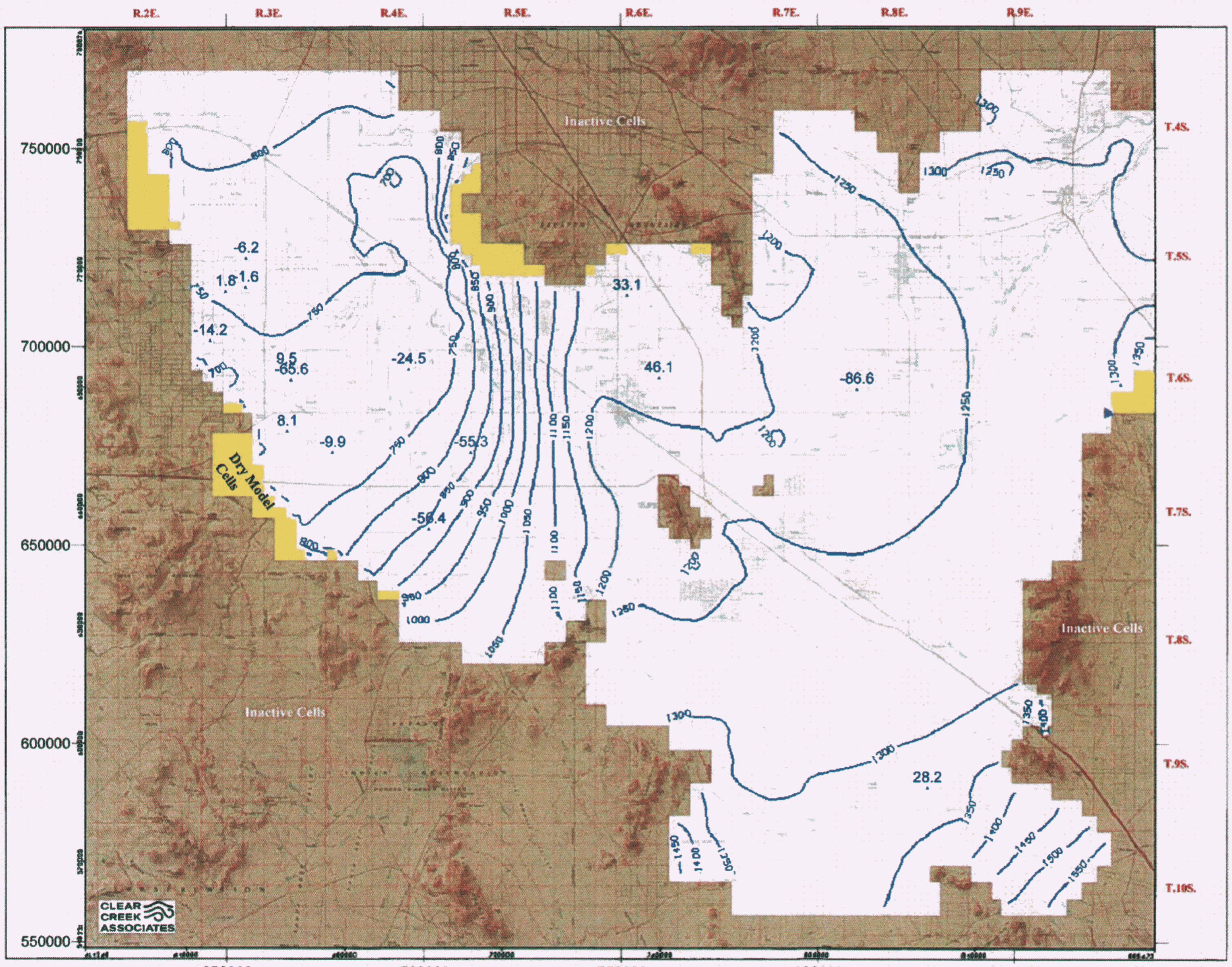
FIGURE 4
2003 Layer 1 Residual Plot
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)



1250 2003 Model calculated water level contour

-8.1 2003 Residual (Calculated – Observed)

FIGURE 5
2003 Layer 2 Residual Plot
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)



—1250 2003 Model calculated water level contour

-8.1 2003 Residual (Calculated – Observed)

FIGURE 6
2003 Layer 3 Residual Plot
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (April 2009)

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in Groundwater Science

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September 3, 2009

Mr. John Schneeman, Manager
ADWR/ Office of Assured & Adequate Water Supply
3550 N. Central Avenue
Phoenix, Arizona 85007

Re: Response to Administrative Completeness Review (dated November 20, 2008), Application for a Physical Availability Demonstration Item No. 9, Arizona Water Company - - Pinal Valley Water Service Area (ADWR File No. 51-700444.0000)

Dear Mr. Schneeman:

This letter has been prepared by Clear Creek Associates, PLC (CCA) on behalf of Arizona Water Company to respond to item no. 9 in the ADWR's Administrative Completeness Review letter dated November 20, 2008, for the subject PAD application. The Departments letter has been discussed in meetings with Department staff on December 16, 2008, and March 6, 2009. This letter response also incorporates issues discussed in a meeting with Department staff on May 28, 2009. The comments presented in the Departments Administrative Completeness Review letter are presented below in italics followed by our response.

9) <u>General Concerns</u>

a) *The AWC updated total committed demand volume for the Maricopa-Stanfield sub-basin is acceptable. The CCA response states that Tables 14 and 15 summarize the (non-AWC) current and committed water demand simulated in the model and include well locations for the Maricopa-Stanfield and Eloy sub-basins. However, the attached tables in the response did not reflect this revised information and must be updated with the correct demand values and well locations.*

<u>Response</u>: Table 1 summarizes current and committed demand simulated in the Maricopa-Stanfield sub-basin and includes the well locations simulated in the model. The total non-Arizona Water Company (AWC) current and committed demand is **46,632** acre-feet/year (AFY) in the Maricopa-Stanfield sub-basin. Table 1 includes a revised demand for the Thunderbird Farms Improvement District of 1,092 AFY as suggested by Department staff in a meeting held on May 28, 2009. Table 2 summarizes the current and committed demand simulated in the Eloy sub-basin including the well locations. The total non-AWC current and committed demand is **88,121** AFY in the Eloy sub-basin.

b.) *There is a groundwater pumping deficit of around 60,000 af/yr simulated in the model versus the pumping volume the Department estimates should be in the model. The deficit appears to be due to the non-inclusion of Indian (SCIP and GRIC) pumping and a volume of long-term storage credits (LTSC) that are too low. However, the deficit may also be caused by model cells dewatering that contain projected pumpage. The deficit remains fairly steady to around 2020 and then starts growing to a high of around 117,000 af/yr in 2057. Due to the removal of LTSC, the deficit drops to around 85,000 af/yr and remains at this volume to 2107. Overall, the volume simulated in the model is ~8.8 million acre-feet short of what was projected by ADWR (60,095,147 vs. 69,918,698 projected). This must be addressed by the applicant.*

__Response__: After completing the revised Arizona Water Company (AWC) transient model (1984 to 2007) the model was set-up to run 100-year projections.

Model Boundary Conditions for the 100-Year Simulation

Model boundary conditions are the same as the AWC transient model with the exception of the following;

- Gila River recharge; assumed 7,450 AFY (1984 to 2005 median value)
- Santa Cruz River recharge; assumed 11,656 AFY (1984 to 2005 median value)
- Picacho Reservoir recharge; assumed 4,845 AFY (1984 to 2005 median value)
- South Picacho constant-flux boundary; assumed 18,000 AFY to year 2030, and 13,000 AFY to year 2107 (ADWR Tucson AMA model results as discussed in our meeting with Department staff on March 6, 2009)

Groundwater Pumping for the 100-Year Simulation

The Department provided a spreadsheet (Master Demand Spreadsheet 6-22-09.xls, provided by Steve Rascona, ADWR) with estimates of future pumping that were incorporated into the model pumping database. The Departments estimate of future pumping also accounted for some conversion of agricultural wells to municipal supply wells. The future pumping estimate also accounts for long-term storage credits by increases in groundwater pumping for the Maricopa-Stanfield Irrigation and Drainage District (MSIDD), the Central Arizona Irrigation and Drainage District (CAIDD), and the Hohokam Irrigation District (HID) over a period of 50-years. Total estimates of pumping for the 100-year simulation are summarized in Table 3.

Agricultural Recharge for the 100-Year Simulation

Estimates of agricultural recharge for the 100-year simulation assumed a 35 percent irrigation efficiency based on the 100-year pumping estimates for MSIDD, CAIDD, HID, and Non-District (Table 3). Agricultural recharge estimates for the Ak-Chin community were based on the average CAP deliveries from 1988 to 2005 and an irrigation efficiency of 35 percent. Agricultural recharge estimates for the SCIDD is the average value from 1984 to 2000, this method was applied to the SCIDD due to the large component of surface water delivery and large main canal and lateral losses. The agricultural recharge estimates for the 100-year simulation are summarized in Table 4.

Reducing the Groundwater Pumping Deficit

In an effort to reduce the pumping deficit caused by cell de-watering, numerous 100-year model projections were run. Model pumping that was being lost due to cell de-watering was allocated to lower model layers and in some cases wells were moved to adjacent cells to reduce cell de-watering. The total conceptual pumping for the 100-year simulation is **77,228,538** AF (this total excludes groundwater pumping simulating underflow); the final 100-year projection run simulated **76,078,131** AF. The total model deficit for the 100-year simulation is **~1,150,000** AF (~11,500 AFY). Model pumping deficits range from about **-200** AF to **-36,000** AF at the end of the simulation (Table 5). The updated 100-year projection simulates **98.5%** of the total pumping (simulated vs. conceptual). The majority of "lost" pumping is located along the margins of the Maricopa-Stanfield sub-basin, near the Casa Grande and Sacaton Mountains, and areas north of Coolidge and Florence. Model cell de-watering is a result of high pumping rates, in some cases numerous pumping wells in one model cell, and model boundary conditions such as near sub-basin margins with decreasing depth-to-bedrock. Table 5 presents a summary of the 100-year pumping analysis.

Evaluation of Groundwater Supply Availability

The 100-year predictive simulation was run to determine the available groundwater supply for the Arizona Water Company Pinal Valley Water Service Area (PVWSA) in meeting the current, committed, and projected water demands. The predictive simulation includes **141,419** AFY of non-Arizona Water Company current and committed demand. The predictive model simulates groundwater pumping from the Company's existing service area wells, and from **183** "new" wells projected to be located within the PVWSA system. In reality, as the service area population grows, many of the "new" wells will not be new wells but rather replacement wells for agricultural wells that are no longer needed for irrigation or converted agricultural wells. Table 6 summarizes the well locations and pumping rates for the existing and "new" wells for the 100-year model simulation. The modeled "new" wells were located based on criteria that included: location in relation to the current and planned water transmission system, location in relation to the most productive areas of the aquifer, and in an effort to locate wells away from known areas of severe water level drawdown. The predictive simulation includes a demand of **120,000** AF/yr for the AWC PVWSA beginning in year 2036. The following pumping schedule was applied to the Arizona Water Company wells:

- 2008 17,153 AF
- 2009-2015 25,000 AF/yr
- 2016-2020 45,000 AF/yr
- 2021-2025 55,000 AF/yr
- 2026-2030 75,500 AF/yr
- 2031-2035 110,000 AF/yr
- 2036-2108 120,000 AF/yr

The estimated water demand for the AWC - Pinal Valley Water Service Area of 120,000 AFY was simulated in MODFLOW's Well Package. Ending model calculated heads from the 1984 to 2007 transient simulation served as the starting heads for the 100-year simulation. The model calculated 100-year groundwater elevation contours for model layers 2 and 3 (the MSCU and LCU) are shown on Figures 1 and 2. The model calculated 100-year drawdown for layers 2 and 3 are shown on Figures 3 and 4. The depth-to-bedrock and model predicted 100-year depth-to-groundwater for model layers 2 and 3 are shown on Figures 5 to 8. The 100 year depth-to-groundwater contours were corrected to 2003 measured water level contours by subtracting the model calculated drawdown from the 2003 measured groundwater contours, and then subtracting the corrected 100-year groundwater elevation from the land surface elevation. This was done to reduce the influence of model error.

Figure 5 indicates a 100-year depth-to-water for model layer 2 ranging from about **500** to **900** feet across the western portion of the PVWSA, and about **200** to **800** feet across the eastern portion of the PVWSA. Figure 6 shows the layer 2 100-year depth-to-water contours overlain with the depth-to-bedrock contours. Figure 7 indicates a 100-year depth-to-water for model layer 3 ranging from about **300** to **900** feet across the PVWSA. Figure 8 shows the layer 3 100-year depth-to-water contours overlain with the depth-to-bedrock contours. Predictive groundwater model results indicate a 100-year depth-to-water that is above the Pinal AMA limit of 1,100 feet depth-to-groundwater limit established for water providers in the Pinal AMA by ADWR Rule R012-15-703. A MODFLOW Zonebudget analysis (Table 7) for model cells simulating future Arizona Water Company pumping indicates the full **120,000** ac-ft/year is being simulated in the last model stress period. Table 7 also summarizes a MODFLOW ZoneBudget analysis of other current and committed demands which indicates full simulation.

Summary

Clear Creek Associates groundwater modeling results support the physical demonstration of the projected groundwater water demands through the year 2107 for the AWC – Pinal Valley Water Service Area of 120,000 ac-ft/yr. Predicted groundwater model results are conservative based on the following model assumptions:

- The predictive model incorporates Department provided estimates of future pumping of nearly 78 million acre-feet (Table 3).
- Model results are conservative as a majority of the 125,745 acres of agricultural land within AWC's Pinal Valley Water Service area will likely be urbanized over the next 100 years and the associated groundwater demands will cease.
- The predictive model accounts for the pumping of nearly 1,611,600 ac-ft of accrued long-term storage credits in the Pinal AMA over a 50-year period.
- All non-AWC committed demands (about 141,419 AFY) are simulated as being pumped in the final predictive simulation year (Table 7).
- The predictive simulation does not account for CAGRD replenishment (recharge) in the Pinal AMA of groundwater pumped by its members which exceeds the pumping limitations imposed by the Assured Water Supply Rules.

The model predicted depth-to-water does not exceed the 1,100-foot limit for the AWC – PVWSA. Results of the groundwater modeling study support that groundwater is physically, legally (subject to the appropriate conversion of IGFRs to M&I use), and continuously available for 100 years. The electronic Visual MODFLOW datasets for the 100-year simulation are provided on CD in Appendix A.

a) *Based on recognition that there is a significant pumping deficit in the model it is not possible to determine at this time whether there will be projected negative impacts (dewatering of projected Assured Water Supply (AWS) groundwater withdrawal locations or projected 100-year depths to static water that exceed 1,100 feet) for holders of issued AWS certificates, designations, or analyses in the model area. Once the deficit pumping issues are suitably addressed it will be necessary for the applicant to determine if negative impacts are projected for any issued AWS permit holders, and if so, modify the projected 100-year AWC groundwater demands to mitigate any such potential negative impacts.*

Response: The current 100-year predictive simulation accounts for about 98.5% of total pumping (simulated vs. conceptual). Lost pumping from model layer 2 includes areas of the eastern Maricopa-Stanfield sub-basin, near the Sacaton Mountains, and areas north of Coolidge and Florence (Figures 3 and 5). Lost pumping from model layer 3 includes areas along the margins of the Maricopa-Stanfield sub-basin, near the Casa Grande and Sacaton Mountains, and areas north of Coolidge and Florence (Figures 4 and 7). Model cell de-watering is from a combination of factors which may include; high pumping rates, numerous pumping wells in one model cell, and boundary conditions such as decreasing depth-to-bedrock along basin margins. A ZoneBudget analysis of the current and committed demand pumping is presented in Table 7 which indicates that 100% of the current and committed demand is simulated. Figures 5 and 7 show that the 100-year depth to static water does not exceed 1,100 feet, therefore no negative impacts are projected for current AWS permit holders.

If you have any questions regarding any of the information presented in this letter please contact me at 480-659-7131.

Sincerely,

CLEAR CREEK ASSOCIATES, PLC

REGISTERED GEOLOGIST
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STEVE W.
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Steven W. Corell, R.G.
Senior Hydrogeologist

Expires: 03-31-2012.

cc: Bill Garfield, Arizona Water Company
Tom Harrell, Arizona Water Company
Doug Bartlett, Clear Creek Associates

Figures

1. 100-year Groundwater Elevation Model Layer 2
2. 100-year Groundwater Elevation Model Layer 3
3. 100-year Drawdown Model Layer 2
4. 100-year Drawdown Model Layer 3
5. 100-year Depth-to-Water Model Layer 2
6. Depth-to-Bedrock & 100-year Depth-to-Water Model Layer 2
7. 100-year Depth-to-Water Model Layer 3
8. Depth-to-Bedrock & 100-year Depth-to-Water Model Layer 3

Tables

1. Maricopa-Stanfield Sub-basin - - Current & Committed Demand Pumping
2. Eloy Sub-basin - - Current & Committed Demand Pumping
3. 100-year Pumping Estimate for Arizona Water Company Pinal Model
4. Agricultural Recharge Estimate for 100-Year Simulation
5. 100-Year Pumping Analysis - - Conceptual vs. Modeled
6. Wells Used to Simulate Arizona Water Company Demand
7. ZoneBudget Analysis of Current & Committed Demand

Appendices

A. Groundwater Model Files for 100-year Projection (on CD)

REGISTERED GEOLOGIST
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FIGURES

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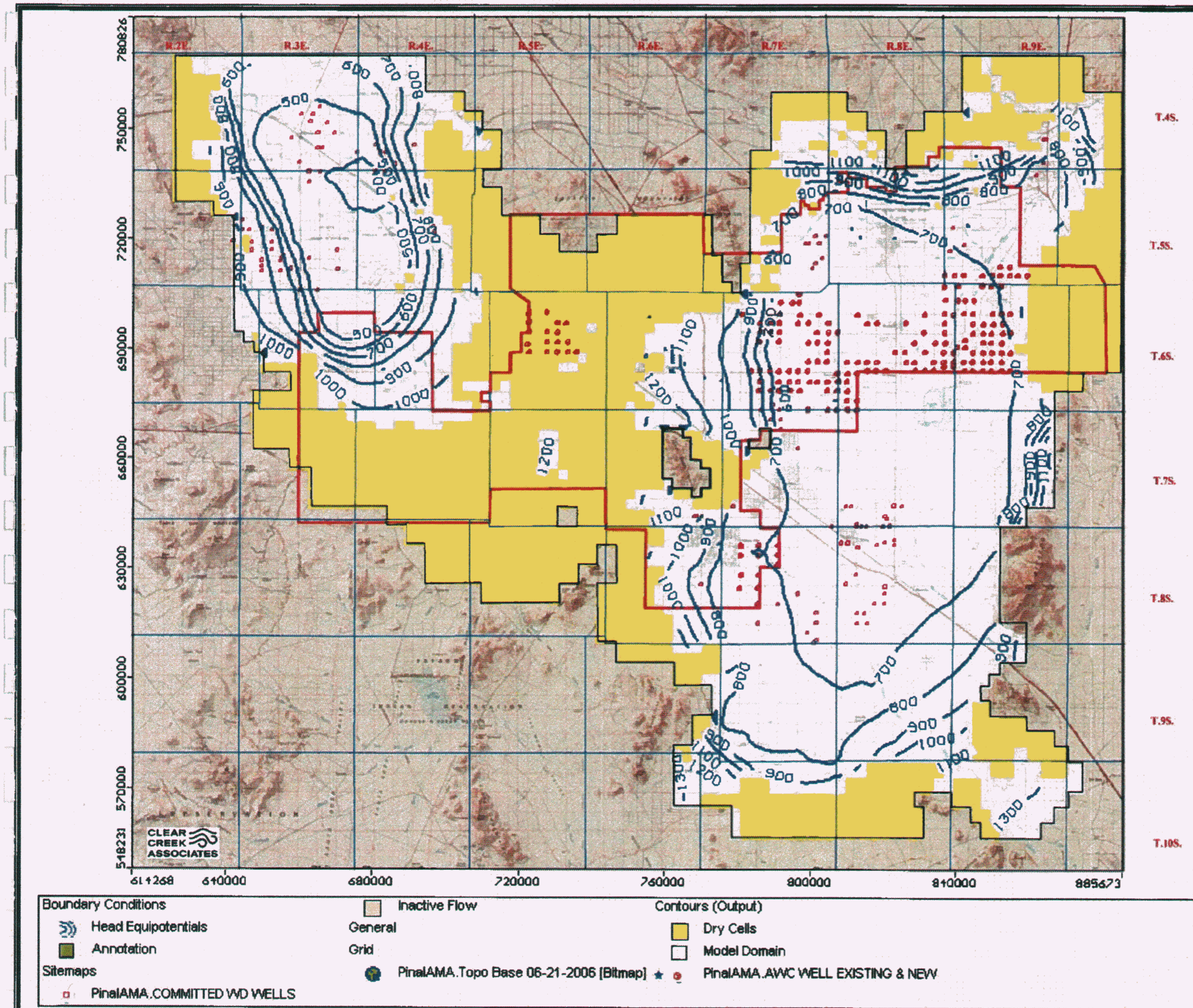


FIGURE 1
100-Year Groundwater Elevation - - Layer 2
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

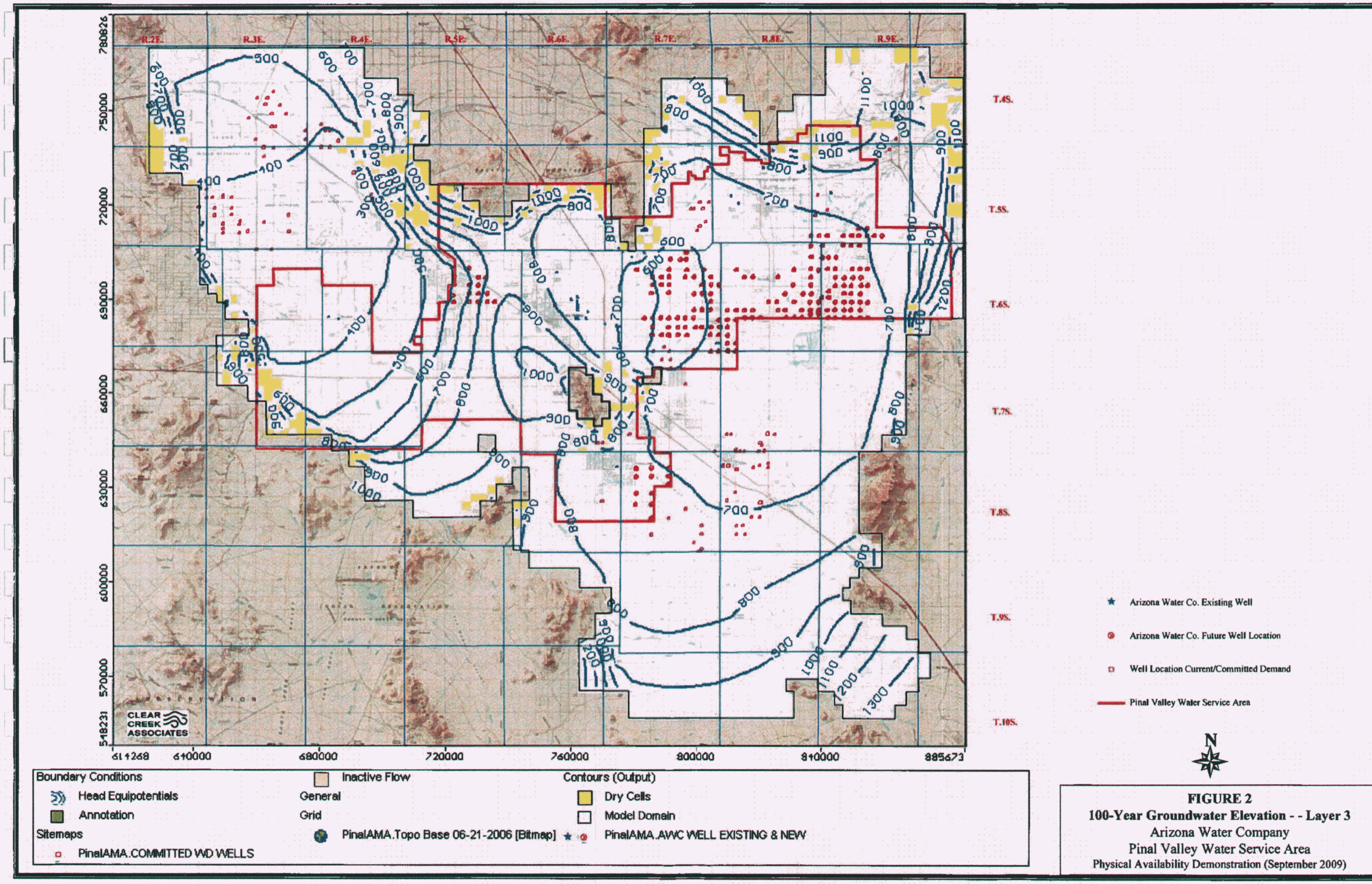


FIGURE 2
100-Year Groundwater Elevation - - Layer 3
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

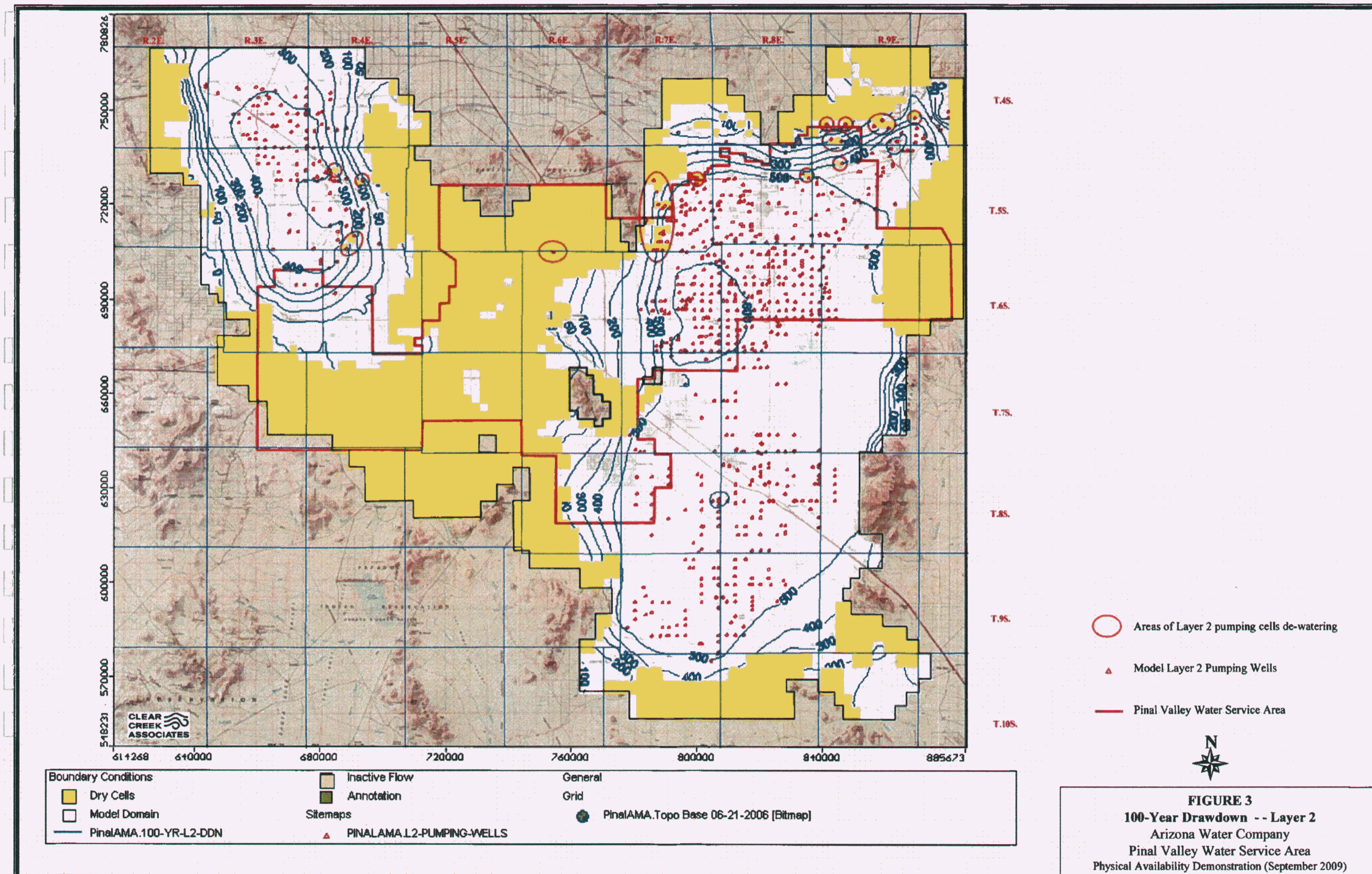


FIGURE 3
100-Year Drawdown - - Layer 2
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

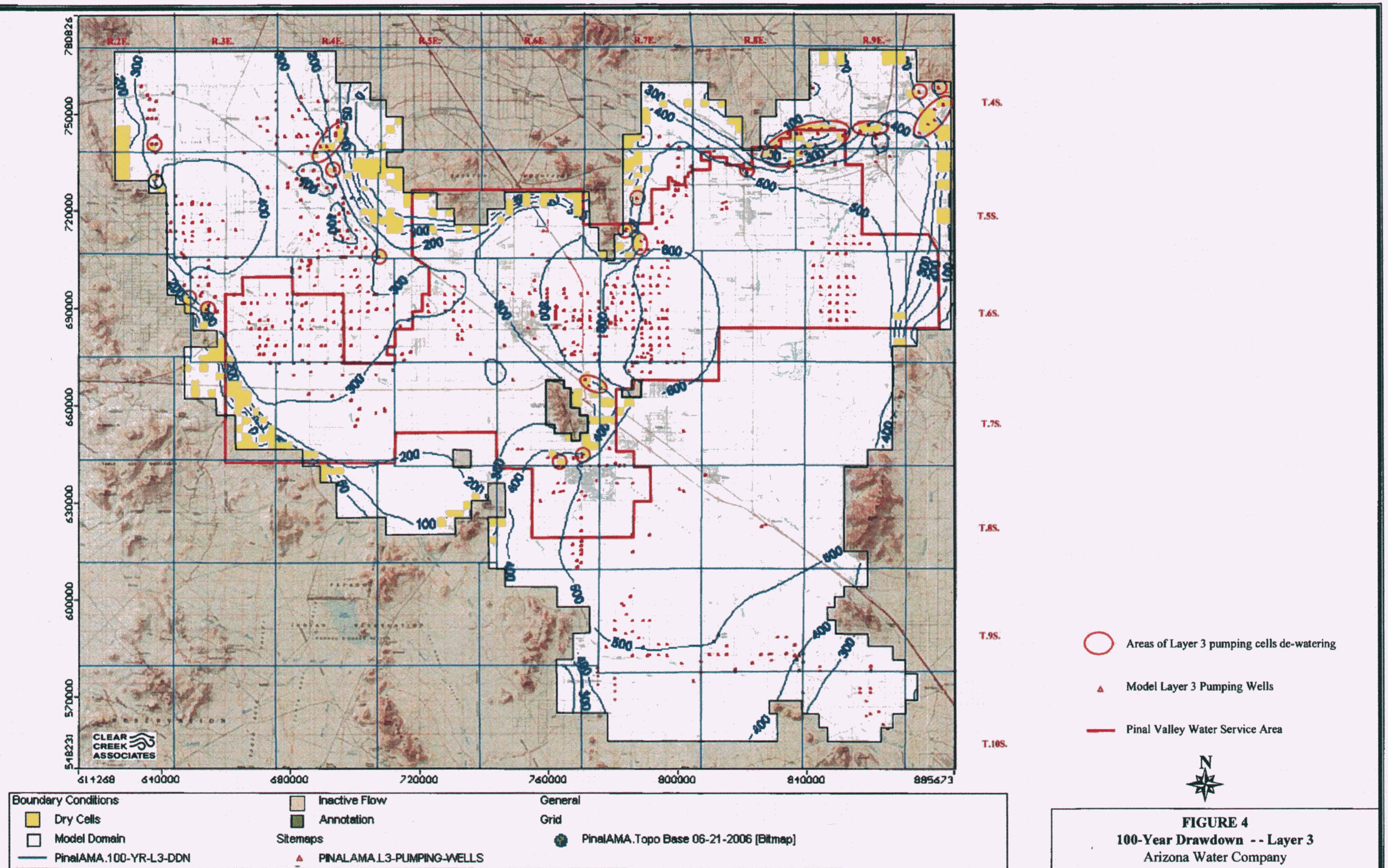


FIGURE 4
100-Year Drawdown -- Layer 3
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

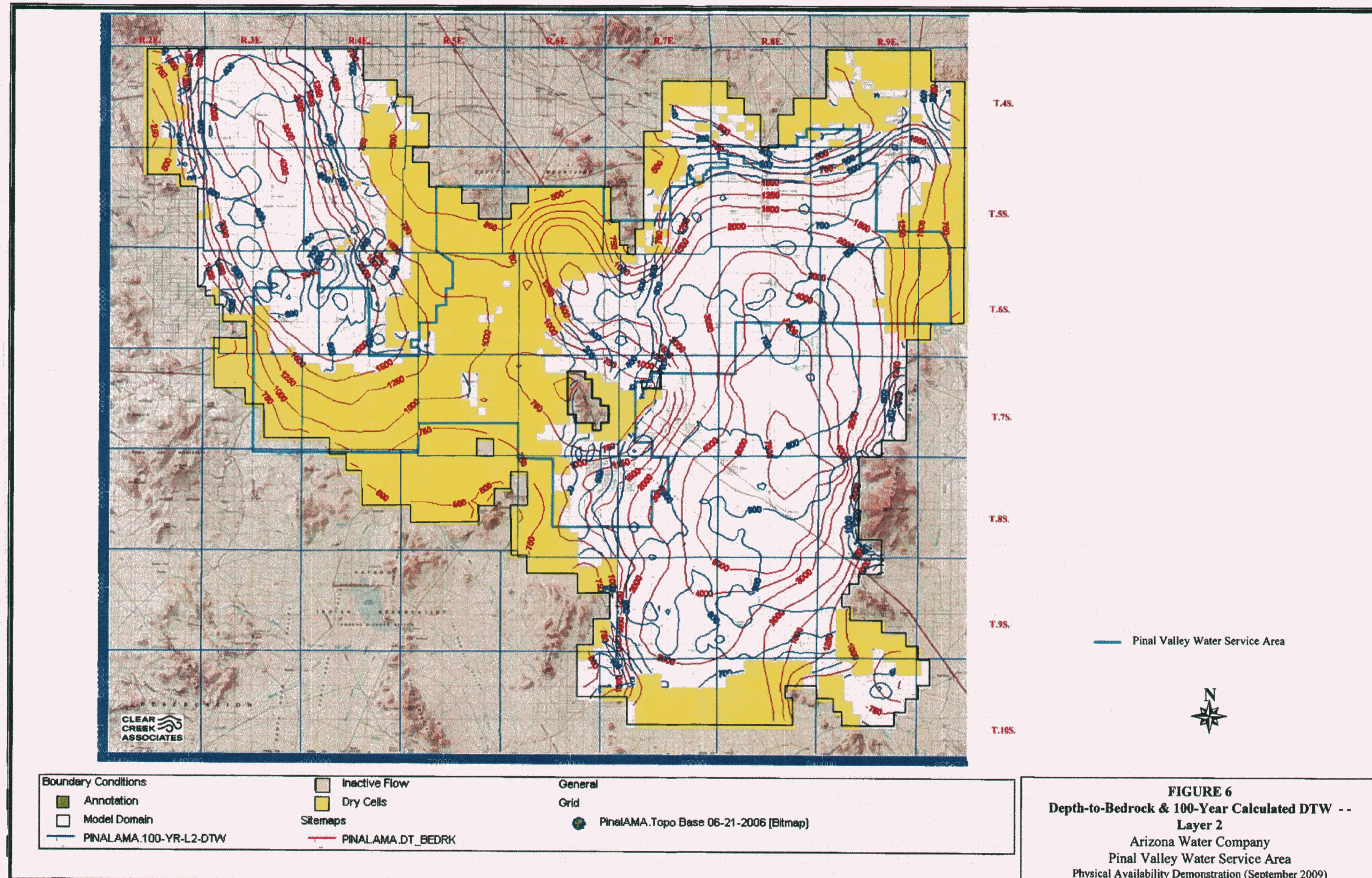


FIGURE 6
Depth-to-Bedrock & 100-Year Calculated DTW - -
Layer 2
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

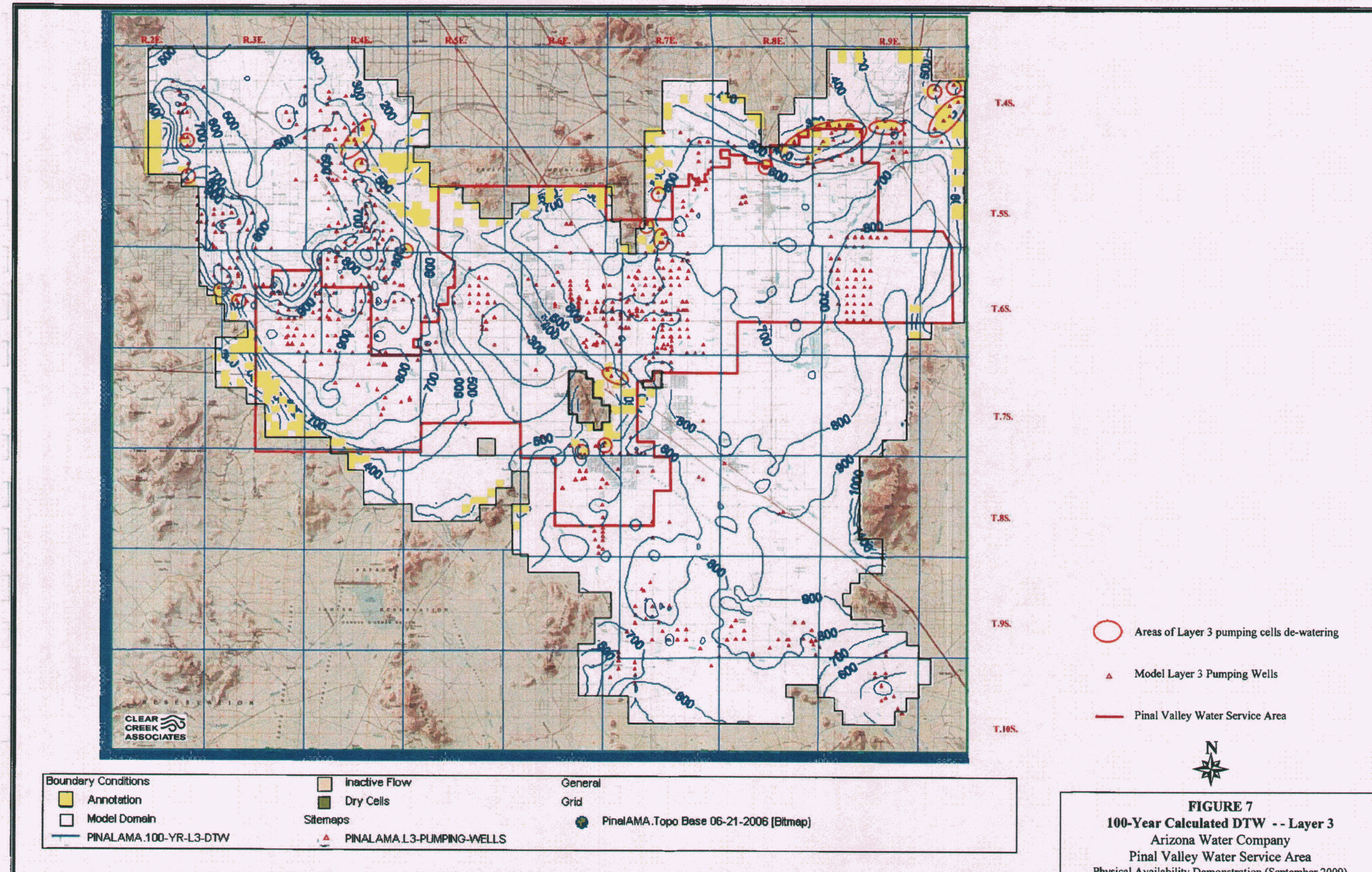
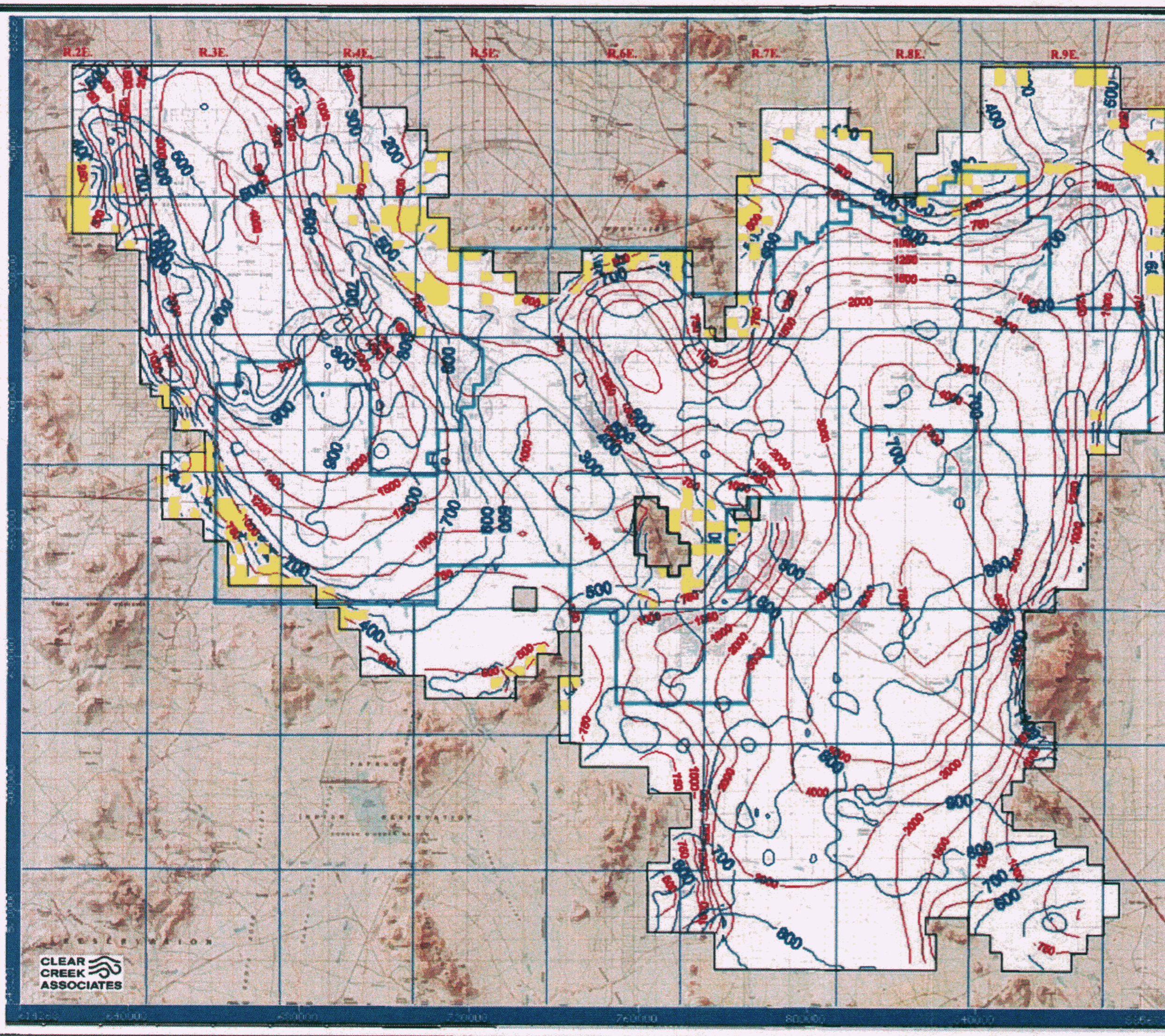


FIGURE 7
100-Year Calculated DTW -- Layer 3
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)



Boundary Conditions
- Annotation
- Model Domain
- PINALAMA.100-YR-L3-DTW
- Inactive Flow
- Dry Cells
- Sitemaps
- PINALAMA.DT_BEDRK
- General
- Grid
- PinalAMA.Topo Base 06-21-2006 [Bitmap]

FIGURE 8
Depth-to-Bedrock & 100-Year Calculated DTW -- Layer 3
Arizona Water Company
Pinal Valley Water Service Area
Physical Availability Demonstration (September 2009)

TABLES

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Table 1
Maricopa-Stanfield Sub-basin - - Current and Committed Demand Pumping

REGISTRYID	LOCATION	INSTALLED	WELLDEPTH	OWNER	Sub-basin	CC&N Sub Area	2008 - 2107 (AF)
620624	D-05-04 14CCB	1-Jan-58	900	CITY OF CASA GRANDE	Maricopa-Stanfield	Copper Mountain Community (4113.66 afy)	1,371.2
620625	D-05-04 14CCC	1-Jan-61	1300	CITY OF CASA GRANDE	Maricopa-Stanfield	Copper Mountain Community (4113.66 afy)	1,371.2
620626	D-05-04 23BBB	1-Jan-60	908	CITY OF CASA GRANDE	Maricopa-Stanfield	Copper Mountain Community (4113.66 afy)	1,371.2
					Maricopa-Stanfield		4113.66
612737	D-04-03-14CBB		1000	SMITH,J E	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
601069	D-04-03-15CCC	1-Jan-57	500	FRIEDMAN, BEN,C	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
617337	D-04-03-15DCD	22-Apr-56	700	VANCE JR,J D	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612738	D-04-03-22BDC		1000	SMITH,J E	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612742	D-04-03-22DDD		800	MARICOPA GRVS-SMITH,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612736	D-04-03-23BDD		1200	SMITH,J E	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
624038	D-04-03-23DDC	28-Jun-80	1920	ORCHARD CITY INC.	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
623818	D-04-03-25DDD	1-Sep-63	1700	SMITH,J E	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
605054	D-04-03-26CBD	1-Jan-71	1400	TURF GRASS FARMS INC,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612741	D-04-03-27DAD		1875	MARICOPA GRVS-SMITH,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
622132	D-04-03-28ABC	10-Mar-76	600	JOHNSON JR,L L	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
622128	D-04-03-33ADD	1-Jan-62	500	JOHNSON JR,L L	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612711	D-04-03-34CDD		800	DUNN FARMS,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
612712	D-04-03-35CCC	1-Jan-63	2458	DUNN FARMS,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
623817	D-04-03-36ADD	1-Sep-51	1400	SMITH,J E	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
610519	D-04-04-28DAA	1-Jan-54	830	ANDERSON, OLIVER,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
509941	D-04-04-29CCD	29-Aug-85	1100	MAGGIO, ANTHONY,J	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
623902	D-04-04-29CDD		995	MAGGIO, ANTHONY,J	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
605231	D-04-04-30DAA	1-Jan-58	830	FEMCO LIMITED PNTSHP,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
605234	D-04-04-31DDD	1-Jan-48	500	FEMCO LIMITED PNTSHP,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
609593	D-04-04-32CDD	1-Jan-58	954	SEL THE FARM LC,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
609592	D-04-04-32DAA	1-Jan-68	1000	SEL THE FARM, LC,	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.41
622119	D-05-04-09ADD	1-Jan-76	983	HARTMAN,P M	Maricopa-Stanfield	Santa Cruz Water Co N (14154.47 afy)	615.45
					Maricopa-Stanfield		14,154.47
612414	D-05-03-17CCB	1-Jan-69	1000	MCLEAN FARMS ETAL,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612246	D-05-03-17CCC	1-Jan-69	1000	MCLEAN FARMS ETAL,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612247	D-05-03-17DCC	1-Jan-73	1000	MCLEAN FARMS ETAL,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
502619	D-05-03-18BCC	24-Jul-82	1360	DIAMOND BAR RANCH LC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
625628	D-05-03-18CCC	1-Jan-69	1005	DIAMOND BAR RANCH LC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
625626	D-05-03-18CDD	1-Jan-60	1300	DIAMOND BAR RANCH LC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612407	D-05-03-19DBB	1-Jan-74	1000	M GROUP ONE JV,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612406	D-05-03-19DCC	1-Jan-51	606	M GROUP ONE JV,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612249	D-05-03-20DBB	1-Jan-71	1000	MCLEAN FARMS ETAL,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612248	D-05-03-20DCC	1-Jan-62	1300	MCLEAN FARMS ETAL,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612250	D-05-03-28BCB	1-Jan-78	1200	MARICOPA RD ASSOC.,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612401	D-05-03-28CBB	1-Jan-55	1200	MARICOPA RD ASSOC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612402	D-05-03-28CCC	1-Jan-55	900	ELMORE, JACKSON,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
612403	D-05-03-28CDD	1-Jan-57	900	ELMORE JACKSON,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
625623	D-05-03-29BCC	1-Jan-64	1000	HAM LIMITED LLC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
625627	D-05-03-29CBC	1-Jan-78	1400	HAM LIMITED LLC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
625622	D-05-03-29CCC	1-Jan-81	1000	HAM LIMITED LLC,	Maricopa-Stanfield	Santa Cruz Water Co SW (17,753.95 afy)	1,044.35
					Maricopa-Stanfield		17,753.95
999136	D-05-03-26AAA			SANTA ROSA WATER CO NEW WELL 1	Maricopa-Stanfield	Santa Rosa Water Co (9,476.09 afy)	1,895.22
999137	D-05-03-26DDD			SANTA ROSA WATER CO NEW WELL 2	Maricopa-Stanfield	Santa Rosa Water Co (9,476.09 afy)	1,895.22
999138	D-05-03-27ACC			SANTA ROSA WATER CO NEW WELL 3	Maricopa-Stanfield	Santa Rosa Water Co (9,476.09 afy)	1,895.22
999139	D-05-03-34CCC			SANTA ROSA WATER CO NEW WELL 4	Maricopa-Stanfield	Santa Rosa Water Co (9,476.09 afy)	1,895.22
999140	D-05-03-34DDD			SANTA ROSA WATER CO NEW WELL 5	Maricopa-Stanfield	Santa Rosa Water Co (9,476.09 afy)	1,895.22
					Maricopa-Stanfield		9,476.09
999141	D-05-03-03ACC			WESTERN PUEBLO RANCHETTES NEW WELL 1	Maricopa-Stanfield	The Ranches at Maricopa (42 afy)	42.00
					Maricopa-Stanfield		42.00
634208	D-06-02-24DBB	7-Feb-81	750	THUNDERBIRD FARMS (58-001342.0000)	Maricopa-Stanfield	Thunderbird Farms ID (1092 afy)	546
[redacted]					Maricopa-Stanfield	Thunderbird Farms ID (1092 afy)	546
					Maricopa-Stanfield		1,092.00

46,632.17

Table 2
Eloy Sub-basin - - Current and Committed Demand Pumping

REGISTRYID	LOCATION	INSTALLED	WELLDEPTH	OWNER	Sub-basin	CC&N Sub Area	2006 - 2030 (AF)	2031 - 2107 (AF)
211602	D-04-08 19BAA	5/29/2006	770	JOHNSON UTILITIES	Eloy	Johnson Pinal DAWS (56-001538.0000)	531.82	531.82
212512	D-04-08 20CCC	10/16/2006	635	JOHNSON UTILITIES	Eloy	Johnson Pinal DAWS (56-001538.0000)	531.82	531.82
212514	D-04-08 [illegible]	10/6/2006	600	JOHNSON UTILITIES	Eloy	Johnson Pinal DAWS (56-001538.0000)	531.82	531.82
					Eloy	Sub-Total	1595.46	1595.46
604516	D-07-08-35ACC	1/1/1973	825	ISOM,W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604500	D-07-08-35ACD	1/1/1962	780	ISOM,W W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604508	D-07-08-35ADD	1/1/1976	1001	ISOM,W W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605457	D-07-07-10DDD		1000	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605491	D-07-07-30DCC	7/8/1975	1000	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605490	D-07-07-36DCD	4/1/1981	1000	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604295	D-07-08-30CDD	1/1/1946	600	T.L.C. INVESTMENTS,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604294	D-07-08-30DCD	1/1/1930	588	T.C.L. INVEST CORP,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
801355	D-07-08-31DDA		1200	ALEMAN, KATHY K.W.,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
801364	D-07-08-31DDD		1000	ALEMAN, KATHY K.W.,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
801366	D-07-08-32CCD		750	ALEMAN, KATHY K.W.,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
801357	D-07-08-32CDD		790	ALEMAN, KATHY K.W.,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
621871	D-07-08-33BDD	1/1/1951	1400	ROHE, ADELE,W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
621873	D-07-08-33CDC		1400	ROHE, ADELE,W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
621874	D-07-08-33DBB		1400	ROHE, ADELE,W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
621872	D-07-08-33DCD		1400	ROHE, ADELE,W	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604083	D-08-07-21DDD	1/1/1949	1897	HAMILTON FARMS,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604081	D-08-07-22ADD	1/1/1939	800	HAMILTON FARMS,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604074	D-08-07-26ADD	1/1/1978	1720	HAMILTON FARMS,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
617999	D-08-07-26DDD		1200	ADVISOR MORTGAGE INC,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
604064	D-08-07-29DDD	1/1/1947	1000	HAMILTON FARMS,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
617932	D-08-07-35BDD	1/1/1959	1600	ADVISOR MORTGAGE INC,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
617937	D-08-07-35DDA	1/1/1957	1100	ADVISOR MORTGAGE INC,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
617936	D-08-07-35DDC	1/1/1976	1200	ADVISOR MORTGAGE INC,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
591447	D-08-08-06CCA	11/5/2002	1100	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605452	D-08-08-06CCA	1/27/1981	1115	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605455	D-08-08-06DCB	11/26/1980	1100	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
605454	D-08-08-06BBB		1000	ELOY, CITY OF,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
626501	D-08-08-18ADD		1500	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
626503	D-08-08-18CDD	11/26/1973	1500	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
618528	D-08-08-20DDD		2100	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
626496	D-08-08-21BAA	3/16/1974	1500	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
626497	D-08-08-21BDD		1500	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
618530	D-08-08-21CDD	2/1/1960	1810	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
618526	D-08-08-29BCC		1685	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
626498	D-08-08-29BDD	2/24/1954	1345	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
618534	D-08-08-29CCC		996	RANCHO TIERRA PRIETA,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
[illegible]	D-08-08-29DCC	1/1/1937	1500	GRUNT,	Eloy	ELOY DESIGNATION (48,545 afy)	960	1,277.50
					Eloy	Sub-Total	[illegible]	[illegible]
610432	D-04-09 25BDD	1/1/1940	350	FLORENCE, TOWN OF,	Eloy	FLORENCE DESIGNATION (12,310.7 afy)	2,462.14	2,462.14
618533	D-04-09 36CAC	1/1/1947	375	FLORENCE, TOWN OF,	Eloy	FLORENCE DESIGNATION (12,310.7 afy)	2,462.14	2,462.14
610433	D-04-09-25BDC	1/1/1940	350	FLORENCE, TOWN OF,	Eloy	FLORENCE DESIGNATION (12,310.7 afy)	2,462.14	2,462.14
619535	D-04-09-36CAC	7/5/1939	575	FLORENCE, TOWN OF,	Eloy	FLORENCE DESIGNATION (12,310.7 afy)	2,462.14	2,462.14
619534	D-05-09-02ADA	1/1/1953	575	FLORENCE, TOWN OF,	Eloy	FLORENCE DESIGNATION (12,310.7 afy)	2,462.14	2,462.14
					Eloy	Sub-Total	12,310.7	12,310.7
612758	D-08-08-04CCC	12/29/1960	1600	DESERT SUN FARMS LLC,	Eloy	PALMILLA (2,810.77 afy)	702.7	702.7
612759	D-08-08-04CDA		1500	DESERT SUN FARMS LLC,	Eloy	PALMILLA (2,810.77 afy)	702.7	702.7
612760	D-08-08-04DAD	8/12/1960	1500	DESERT SUN FARMS LLC,	Eloy	PALMILLA (2,810.77 afy)	702.7	702.7
612756	D-08-08-04DDD		1500	DESERT SUN FARMS LLC,	Eloy	PALMILLA (2,810.77 afy)	702.7	702.7
					Eloy	Sub-Total	2810.8	2810.8
999396	D-06-07 33CCC			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999397	D-06-07 33DAC			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999398	D-06-07 33DDD			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999395	D-06-07 34BBB			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999400	D-07-07 03BCC			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999401	D-07-07 03CCC			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
999399	D-07-07 04ACC			PICACHO WATER COMPANY	Eloy	Picacho Water Co (11,854.71 afy)	1,693.5	1,693.5
					Eloy	Sub-Total	11,854.71	11,854.71
621804	D-05-07-24AAA	1/1/1975	1000	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621809	D-05-07-24ABB	1/1/1972	1230	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621823	D-05-07-24ACD	1/1/1938	300	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621808	D-05-07-24BCD	1/1/1946	1525	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621834	D-05-07-24BDC	1/1/1947	497	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621810	D-05-07-25AAC	1/1/1955	550	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621822	D-05-07-25ACC	1/1/1958	450	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
621818	D-05-07-25CAD	1/1/1963	580	SUNDANCE FARMS INC.	Eloy	Sandia (9695.06 afy)	1,211.88	1,211.88
					Eloy	Sub-Total	[illegible]	[illegible]
606215	D-08-08-14DDD	6/26/1946	1663	SUNLAND WATER COMPANY	Eloy	SUNLAND WATER CO (640.37 afy)	640.37	640.37
					Eloy	Sub-Total	640.37	640.37
601139	D(07-08) 27CCD		1110	VILLA GRANDE DWID	Eloy	VILLA GRANDE DWID (100.81 afy)	50.41	50.41
601140	D(07-08) 28DDD	1/1/1960	1020	VILLA GRANDE DWID	Eloy	VILLA GRANDE DWID (100.81 afy)	50.41	50.41
					Eloy	Sub-Total	100.81	100.81
622043	D-08-08 22ABD			PICACHO WID (56-001331.0000)	Eloy	Picacho WID (568 afy)	284.00	284.00
622044	D-08-08 22ADD		1000	PICACHO WID (56-001331.0000)	Eloy	Picacho WID (568 afy)	284.00	284.00
					Eloy	Sub-Total	568.00	568.00

TOTAL	76,055.91	88,120.51

Table 3
100-Year Pumping Estimate for Arizona Water Company Pinal Model

Year	Total Ak-Chin	Total SCIDD	MSIDD	MSIDD AG converted to Muni	MSIDD LTSCs	CAIDD	CAIDD AG converted to Muni	CAIDD LTSCs	HID LTSCS	Total Non-AWC Approved Demand (minus pumpage in 2008 only)	Other AG (includes HID)	Other AG to Muni & retirement (includes HID) from ROGR	Other non-AG 2008 demand (does not include recovery) from 2008 ROGR	Total AWC graduated to include full appliction volume over 100 years	Total Groundwater Pumping	Granite Knob Outflow	Florence Gap Outflow	Total Pumping including Sub-flow
2008 ROGR except SCIDD (2005)	250	30,028	134,330	(4,011)	13,569	126,868	(9,790)	8,137	10,526	125,481	102,482	(3,558)	19,721	17,153	571,187	7,248	3,220	581,655
2009 to 2015	250	33,935	109,775	(13,156)	13,569	81,987	(7,698)	8,137	10,526	141,419	174,158	(5,474)	19,721	25,000	592,149	7,248	3,220	602,617
2016 to 2020	250	33,935	109,775	(13,156)	13,569	81,987	(7,698)	8,137	10,526	141,419	174,158	(5,474)	18,721	45,000	612,149	7,248	3,220	622,617
2021 to 2025	250	33,935	109,775	(13,156)	13,569	81,987	(7,698)	8,137	10,526	141,419	174,158	(5,474)	19,721	55,000	622,149	7,248	3,220	632,617
2026 to 2030	250	33,935	109,775	(13,156)	13,569	81,987	(7,698)	8,137	10,526	141,419	174,158	(5,474)	19,721	75,500	642,648	7,248	3,220	653,117
2031 to 2035	250	37,477	150,000	0	13,569	150,000	0	8,137	10,526	141,419	199,766	(5,889)	19,721	110,000	834,976	7,248	3,220	845,444
2036 to 2057	250	37,477	150,000	0	13,569	150,000	0	8,137	10,526	141,419	199,766	(5,889)	19,721	120,000	844,976	7,248	3,220	855,444
2058 to 2108	0	37,477	150,000	0	0	150,000	0	0	0	141,419	199,766	(5,889)	19,721	120,000	912,494	7,248	3,220	822,962
															77,710,330			78,757,130

ALL VOLUMES IN ACRE-FT - Values in parenthesis ( ) are negative

SCIDD	San Carlos Irrigation & Drainage District
MSIDD	Maricopa-Stanfield Irrigation & Drainage District
LTSCs	Long-term storage credits
CAIDD	Central Arizona Irrigation & Drainage District
HID	Hohokam Irrigation District
Non-AWC	Non-Arizona Water Company
AWC	Arizona Water Company

Table 4
Agricultural Recharge Estimate for 100-Year Simulation
(Arizona Water Company Pinal Model)

Year	Total Ak-Chin GW Pumping	Ak-Chin Return Flow[1]	Total SCIDD GW Pumping	SCIDD Return Flow[2]	MSIDD	MSIDD AG converted to Muni	MSIDD LTSCs	MSIDD Net GW Pumping	MSIDD Return Flow[3]	CAIDD	CAIDD AG converted to Muni	CAIDD LTSCs	CAIDD Net GW Pumping	CAIDD Return Flow[4]	HID LTSCS	HID	HID Net GW Pumping	HID Return Flow[5]	Non-District Return Flow[6]	GRIC Return Flow[7]	TOTAL
2008 ROGR except SCIDD (2005)	250	28,297	30,028	131,851	134,330	(4,011)	13,569	143,888	50,361	126,868	(9,790)	8,137	125,215	43,825	10,526	80,000	90,526	31,684	29,683	12,308	328,009
2009 to 2015	250	28,297	33,935	131,851	109,775	(13,156)	13,569	110,188	38,566	81,987	(7,698)	8,137	82,426	28,849	10,526	80,000	90,526	31,684	29,683	12,308	301,238
2016 to 2020	250	28,297	33,935	131,851	109,775	(13,156)	13,569	110,188	38,566	81,987	(7,698)	8,137	82,426	28,849	10,526	80,000	90,526	31,684	29,683	12,308	301,238
2021 to 2025	250	28,297	33,935	131,851	109,775	(13,156)	13,569	110,188	38,566	81,987	(7,698)	8,137	82,426	28,849	10,526	80,000	90,526	31,684	29,683	12,308	301,238
2026 to 2030	250	28,297	33,935	131,851	109,775	(13,156)	13,569	110,188	38,566	81,987	(7,698)	8,137	82,426	28,849	10,526	80,000	90,526	31,684	29,683	12,308	301,238
2031 to 2035	250	28,297	37,477	131,851	150,000	0	13,569	163,569	57,249	150,000	0	8,137	158,137	55,348	10,526	80,000	90,526	31,684	29,683	12,308	346,420
2036 to 2057	250	28,297	37,477	131,851	150,000	0	13,569	163,569	57,249	150,000	0	8,137	158,137	55,348	10,526	80,000	90,526	31,684	29,683	12,308	346,420
2058 to 2108	0	28,297	37,477	131,851	150,000	0	0	150,000	52,500	150,000	0	0	150,000	52,500	0	80,000	80,000	28,000	29,683	12,308	335,139

Notes:

ALL VOLUMES IN ACRE-FT - Values in parenthesis ( ) are negative

Ak-Chin Return Flow[1]	Average CAP delivery 1988 to 2005	70,742 afy
	Return flow; assume 35% I.E. and 5% system loss	28,297
SCIDD Return Flow[2]	1984 to 2000 average agricultural recharge	50,344 afy
	1984 to 2000 average main canal losses	23,434 afy
	1984 to 2000 average lateral losses	58,073 afy
	1985 to 2000 average return flow	131,851 afy
	(to account for surface water delivery, main canal losses, and lateral canal losses)	
MSIDD Return Flow[3]	Based on assumed pumping and a return flow of 35% I.E.	
CAIDD Return Flow[4]	Based on assumed pumping and a return flow of 35% I.E.	
HID Return Flow[5]	Based on assumed pumping and a return flow of 35% I.E.	
Non-District Return Flow[6]	1984 to 2001 average	29,683 afy
GRIC Return Flow[7]	1984 to 2004 average	12,308 afy

TABLE 5
100-YEAR PUMPING ANALYSIS - - CONCEPTUAL VS. MODELED
ARIZONA WATER COMPANY PINAL MODEL

SP	Model Days	Year	Cumulative Pumping Model (ft^3)	Total Model Pumping (AF)	Model Pumping less Boundary Wells Out (AF)	Santan-Sacaton Gap (ft^3/d)	Florence Gap (ft^3/d)	Boundary Wells Out (AF)	Conceptual Pumping Non-AWC (AF)	Conceptual Pumping AWC (AF)	Total Conceptual Pumping (AF)	Model Deficit (AF)
1	365	2008	25,488,871,424	585,144	575,886	720,600	384,260	9,258	557,909	17,153	575,062	824
2	730	2009	51,177,181,184	589,722	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
3	1095	2010	76,865,495,040	589,723	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
4	1460	2011	102,553,804,800	589,722	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
5	1825	2012	129,242,114,560	589,722	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
6	2190	2013	153,930,432,512	589,723	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
7	2555	2014	179,618,742,272	589,722	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
8	2920	2015	205,307,052,032	589,722	580,465	720,600	384,260	9,258	555,085	25,000	580,085	380
9	3285	2016	231,853,113,344	609,414	600,156	720,600	384,260	9,258	555,085	45,000	600,085	71
10	3650	2017	258,386,837,504	609,130	599,873	720,600	384,260	9,258	555,085	45,000	600,085	-212
11	4015	2018	284,920,741,888	609,135	599,877	720,600	384,260	9,258	555,085	45,000	600,085	-208
12	4380	2019	311,454,957,568	609,142	599,884	720,600	384,260	9,258	555,085	45,000	600,085	-201
13	4745	2020	337,984,454,656	609,033	599,776	720,600	384,260	9,258	555,085	45,000	600,085	-309
14	5110	2021	364,933,513,216	618,665	609,407	720,600	384,260	9,258	555,085	55,000	610,085	-678
15	5475	2022	391,882,571,776	618,665	609,407	720,600	384,260	9,258	555,085	55,000	610,085	-678
16	5840	2023	418,831,630,336	618,665	609,407	720,600	384,260	9,258	555,085	55,000	610,085	-678
17	6205	2024	445,789,678,848	618,413	609,155	720,600	384,260	9,258	555,085	55,000	610,085	-930
18	6570	2025	472,704,974,848	618,349	609,091	720,600	384,260	9,258	555,085	55,000	610,085	-994
19	6935	2026	500,534,837,248	638,886	629,628	720,600	384,260	9,258	555,085	75,500	630,585	-957
20	7300	2027	528,364,899,648	638,886	629,628	720,600	384,260	9,258	555,085	75,500	630,585	-957
21	7665	2028	556,194,594,816	638,886	629,629	720,600	384,260	9,258	555,085	75,500	630,585	-956
22	8030	2029	584,024,457,216	638,886	629,628	720,600	384,260	9,258	555,085	75,500	630,585	-957
23	8395	2030	611,854,319,616	638,886	629,628	720,600	384,260	9,258	555,085	75,500	630,585	-957
24	8760	2031	648,532,068,304	842,005	832,747	720,600	384,260	9,258	724,978	110,000	834,978	-2,231
25	9125	2032	685,087,391,744	839,195	829,937	720,600	384,260	9,258	724,978	110,000	834,978	-5,041
26	9490	2033	721,642,717,184	839,195	829,937	720,600	384,260	9,258	724,978	110,000	834,978	-5,041
27	9855	2034	758,198,042,624	839,195	829,937	720,600	384,260	9,258	724,978	110,000	834,978	-5,041
28	10220	2035	794,753,368,064	839,195	829,937	720,600	384,260	9,258	724,978	110,000	834,978	-5,041
29	10585	2036	831,751,061,504	849,350	840,092	720,600	384,260	9,258	724,978	120,000	844,978	-4,886
30	10950	2037	868,748,754,944	849,350	840,092	720,600	384,260	9,258	724,978	120,000	844,978	-4,886
31	11315	2038	905,746,448,384	849,350	840,092	720,600	384,260	9,258	724,978	120,000	844,978	-4,886
32	11680	2039	942,744,141,824	849,350	840,092	720,600	384,260	9,258	724,978	120,000	844,978	-4,886
33	12045	2040	979,741,835,264	849,350	840,092	720,600	384,260	9,258	724,978	120,000	844,978	-4,886
34	12410	2041	1,016,700,000,000	848,443	839,185	720,600	384,260	9,258	724,978	120,000	844,978	-5,793
35	12775	2042	1,053,700,000,000	849,403	840,145	720,600	384,260	9,258	724,978	120,000	844,978	-4,833
36	13140	2043	1,090,600,000,000	847,107	837,850	720,600	384,260	9,258	724,978	120,000	844,978	-7,128
37	13505	2044	1,127,600,000,000	849,403	840,145	720,600	384,260	9,258	724,978	120,000	844,978	-4,833
38	13870	2045	1,164,500,000,000	847,107	837,850	720,600	384,260	9,258	724,978	120,000	844,978	-7,128
39	14235	2046	1,201,400,000,000	847,107	837,850	720,600	384,260	9,258	724,978	120,000	844,978	-7,128
40	14600	2047	1,238,400,000,000	849,403	840,145	720,600	384,260	9,258	724,978	120,000	844,978	-4,833
41	16425	2052	1,423,000,000,000	847,567	838,309	720,600	384,260	9,258	724,978	120,000	844,978	-6,669
42	18250	2057	1,607,100,000,000	845,271	836,657	720,600	307,410	8,614	724,978	120,000	844,979	-8,321
43	20075	2062	1,784,000,000,000	812,213	803,599	720,600	307,410	8,614	692,494	120,000	812,494	-8,895
44	21900	2067	1,960,500,000,000	810,376	801,763	720,600	307,410	8,614	692,494	120,000	812,494	-10,731
45	23725	2072	2,136,600,000,000	808,540	800,570	720,600	230,560	7,970	692,494	120,000	812,494	-11,924
46	25550	2077	2,311,500,000,000	803,030	796,268	576,480	230,560	6,762	692,494	120,000	812,494	-16,226
47	27375	2082	2,485,600,000,000	800,275	795,365	432,360	153,700	4,911	692,494	120,000	812,494	-17,129
48	29200	2087	2,659,200,000,000	796,143	792,440	288,240	153,700	3,703	692,494	120,000	812,494	-20,054
49	31025	2092	2,832,100,000,000	793,848	790,788	288,240	76,852	3,059	692,494	120,000	812,494	-21,706
50	32850	2097	3,004,100,000,000	789,715	787,864	144,120	76,852	1,852	692,494	120,000	812,494	-24,630
51	34675	2102	3,175,200,000,000	785,583	783,732	144,120	76,852	1,852	692,494	120,000	812,494	-28,762
52	36500	2107	3,344,700,000,000	778,237	776,385	144,120	76,852	1,852	692,494	120,000	812,494	-36,109
			total model pumping =	76,783,747		total boundry wells out =		705,615				-1,150,407
			net model pumping =	76,078,131								
			conceptual pumping cumulative =	77,228,538								
			total model deficit =	-1,150,407								
			percent pumping simulated =	98.51%								

AF = Acre-Feet
AWC = Arizona Water Company
ft^3/d = cubic feet per day
Non-AWC = Non-Arizona Water Company
SP = Stress Period

TABLE 6
Wells Used to Simulate Arizona Water Company Demand

WellName	LOCATION	INSTALLED	WELLDEPTH	CASINGDEEP	Scenario_Well_Name	Scrn_Top_ftbls	Scrn_Bot_ftbls	Screen Top	Screen Bottom	2008	2015	2020	2025	2030	2035	2040	2107
									Year/Model Days	365	2920	4745	6570	8395	10220	12045	36500
208822	D-06-06-22DDD	Apr-06	1000	1000	AWC CG30	680	980	730.0	435.0	420	674	709.4	469.8	374.1	457.4	499	499
210293	D-05-08-20ACD	Nov-06	1995	1995	AWC CL11	646	1957	759.8	-135.0	0	1010.9	1064	704.7	561.1	686.1	748.4	748.4
210294	D-06-06-15CAD	May-06	1500	1500	AWC CG31	580	1480	825.0	-70.0	40.2	1,011	1,064	705	561	686	748	748
212419	D-05-08-20BBA		1250	1250	AWC CL13	560	1240	865.0	190.0	0.6	1010.9	1064	704.7	561.1	686.1	748.4	748.4
212523	D-06-06-25ACA		1200	1200	AWC CG33	520	980	907.8	447.8	976.7	943.5	993.1	657.7	523.7	640.3	698.5	698.5
506809	D-06-06-22CDC	12-Oct-83	1238	850	AWC CG21			1075.0	177.0	696.1	673.9	709.4	469.8	374.1	457.4	499	499
522319	D-06-06-22BAA	1-Feb-89	1005	1005	AWC CG23	390	990	1020.0	425.0	1296.5	673.9	709.4	469.8	374.1	457.4	499	499
526586	D-06-04-19CDA		1002	1002	AWC ST03	394	1002	891.0	288.0	73.2	404.3	425.6	281.9	224.4	274.4	299.4	299.4
540306	D-06-06-22CDD	23-Dec-93	1000	1000	AWC CG24	390	990	1020.0	425.0	517.4	673.9	709.4	469.8	374.1	457.4	499	499
546719	D-06-06-22BDA	17-Feb-95	1074	1062	AWC CG25	416	1057	994.0	358.0	2017.3	673.9	709.4	469.8	374.1	457.4	499	499
560803	D-06-06-15CDD	18-Feb-97	1240	1240	AWC CG26	600	1240	805.0	170.0	1419.7	1010.9	1064	704.7	561.1	686.1	748.4	748.4
568553	D-06-07-05BAA	1-Nov-98	1110	1110	AWC CG27	550	1090	1000.0	870.0	441.7	673.9	0	0	0	0	0	0
571205	D-07-06-35DDD		1387	1387	AWC CG28	620	1040	860.0	675.0	1085.3	1010.9	1064	704.7	561.1	686.1	748.4	748.4
595284	D-06-06-25BCB	Apr-99	1100	1100	AWC CG29	540	1080	890.0	355.0	798.9	1010.9	1064	704.7	561.1	686.1	748.4	748.4
616588	D-08-06-01DDB	Jan-70	1100	1100	AWC CG34	450	1100	1050.0	405.0	0	337	355	235	187	229	250	250
616594	D-06-06-09BBD	1-Jan-58	1055	1055	AWC CG09			1056.0	340.0	0	0	0	0	0	0	0	0
616595	D-06-06-21BBC	1-Jan-60	1260	1025	AWC CG10			1085.0	230.0	598.2	673.9	709.4	469.8	374.1	457.4	499	499
616598	D-06-06-21BBB		600	600	AWC CG14			1000.0	230.0	179.6	673.9	709.4	469.8	374.1	457.4	499	499
616599	D-06-06-16CDD	1-Jan-78	810	405	AWC CG ABAND			1075.0	800.0	0	0	0	0	0	0	0	0
616600	D-06-06-22BDD	1952	808	808	AWC CG25 OLD	94	795	1316.0	620.0	870.9	673.9	709.4	469.8	374.1	457.4	499	499
616601	D-06-06-15CCB	28-Apr-75	806	739	AWC CG17			1075.0	605.0	0.5	471.7	498.5	328.9	261.8	320.2	349.3	349.3
616603	D-06-06-23CBB	6-Aug-80	1000	1000	AWC CG19	358	974	1057.0	446.0	1590.5	1347.8	1418.7	939.6	748.1	914.8	997.9	997.9
616604	D-06-06-22BAD	2-Nov-77	1000	1000	AWC CG20			1075.0	415.0	1671.4	673.9	709.4	469.8	374.1	457.4	499	499
616606	D-05-08-22CAA	4-Apr-56	1105	1100	AWC CL07			1080.0	325.0	73.8	168.5	482.7	319.7	254.5	311.2	339.5	339.5
616608	D-05-08-10BCA	10-May-61	475	470	AWC CL09			928.0	760.0	1492.1	673.9	0	0	0	0	0	0
616609	D-05-08-10BCA	1-May-78	1000	980	AWC CL10			928.0	762.0	613.2	673.9	709.4	469.8	374.1	457.4	499	499
816682	D-06-07-36ADC				AWC TG01			1000.0	470.0	176.7	269.6	709.4	469.8	374.1	457.4	499	499
816683	D-06-07-36ADD		508	508	AWC TG03			1000.0	470.0	0	652	709	470	374	457	499	499
616684	D-08-04-20CCC		811	811	AWC ST01			910.0	489.0	19.2	87.6	709.4	469.8	374.1	457.4	499	499
616686	D-05-09-17CDC	1930	345	345	AWC VF01			1200.0	770.0	0	101.1	381.6	252.8	201.2	246.1	268.4	268.4
616687	D-05-09-17CDC	Mar-71	700	700	AWC VF02			1200.0	770.0	83.5	0	0	0	0	204	223	223
622167	D-06-06-22DDD		1200	1200	AWC CG22 ABAND	680	980	730.0	435.0	0	0	0	0	0	0	0	0
801030	D-06-07-36ADD				AWC TG			1000.0	470.0	0.01	0	40	26	24	92	101	101
999142	D-05-09-31ACC				AWC-New-1	500	1500	992.0	-8.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999143	D-05-09-31ACC				AWC-New-2	500	1500	979.0	-21.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999144	D-05-09-32BCC				AWC-New-3	500	1500	1004.0	4.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999145	D-05-09-33AAA				AWC-New-4	500	1500	461.0	37.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999146	D-05-09-33ACC				AWC-New-5	500	1500	518.0	44.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999147	D-05-09-33ADD				AWC-New-6	500	1500	518.0	44.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999148	D-05-09-33BCC				AWC-New-7	500	1500	410.0	30.0	0	0	709.4	469.8	374.1	457.4	499	499
999149	D-05-09-34ABB				AWC-New-8	500	1500	549.0	53.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999150	D-05-09-34ACC				AWC-New-9	500	1500	611.0	81.0	0	0	709.4	469.8	374.1	457.4	499	499
999151	D-05-09-34ADD				AWC-New-10	500	1500	718.0	83.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999152	D-05-09-35BCC				AWC-New-11	500	1500	722.0	83.0	0	673.9	709.4	469.8	374.1	457.4	499	499
999153	D-08-07-05CCC				AWC-New-12	1014	1525	505.1	-8.4	0	0	0	469.8	374.1	503.1	548.8	548.8
999154	D-08-07-05DDD				AWC-New-13	1221	1697	301.6	-174.4	0	0	0	469.8	374.1	503.1	548.8	548.8
999155	D-08-07-04DDD				AWC-New-14	1000	1500	530.6	30.6	0	0	0	469.8	374.1	503.1	548.8	548.8
999156	D-08-07-08BCC				AWC-New-15	526	1026	996.6	496.6	0	0	0	469.8	374.1	503.1	548.8	548.8

TABLE 6
Wells Used to Simulate Arizona Water Company Demand

999157	D-08-07-08ADD				AWC-New-16	728	1228	798.8	298.8	0	0	0	469.8	374.1	503.1	548.8	548.8
999158	D-06-05-03CCC				AWC-New-17	500	844	834.0	500.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999159	D-06-05-03DDD				AWC-New-18	500	816	858.0	543.0	0	0	0	0	0	0	0	0
999160	D-08-07-09ADD				AWC-New-19	1077	1576	457.2	-42.2	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999161	D-08-07-17BCC				AWC-New-20	565	1065	985.5	465.5	0	0	739.1	489.5	419.7	528.7	576.8	576.6
999162	D-08-07-17ADD				AWC-New-21	712	1212	823.2	323.2	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999163	D-08-07-09DDD				AWC-New-22	1037	1537	500.0	0.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999164	D-06-05-09BCC				AWC-New-23	500	877	825.0	449.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999165	D-06-05-09CCC				AWC-New-24	500	915	824.0	410.0	0	0	739.1	489.5	419.7	528.7	576.6	578.8
999166	D-06-05-09DDD				AWC-New-25	500	931	840.0	440.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999167	D-06-05-10ACC				AWC-New-26	500	895	871.0	480.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999168	D-06-05-10ADD				AWC-New-27	500	918	899.0	499.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999169	D-06-05-10DCC				AWC-New-28	500	952	863.0	463.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999170	D-06-05-14BCC				AWC-New-29	500	1012	906.0	410.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999171	D-06-05-14CCC				AWC-New-30	500	1035	911.0	411.0	0	0	739.1	489.5	419.7	528.7	576.8	576.6
999172	D-06-05-14CDD				AWC-New-31	500	1035	911.0	411.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999173	D-06-05-15ACC				AWC-New-32	500	1004	867.0	370.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999174	D-06-05-15DCC				AWC-New-33	500	1056	879.0	379.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999175	D-06-05-16ADD				AWC-New-34	500	985	846.0	370.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999176	D-06-05-16CCC				AWC-New-35	500	1028	838.0	310.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999177	D-06-05-16DDD				AWC-New-36	500	1046	859.0	359.0	0	0	739.1	489.5	419.7	528.7	576.8	578.8
999178	D-06-05-17ADD				AWC-New-37	500	1030	834.0	304.0	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999179	D-08-07-20BBB				AWC-New-38	570	966	965.5	569.1	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999180	D-08-07-20AAA				AWC-New-39	753	1188	791.0	355.5	0	0	739.1	489.5	419.7	528.7	576.8	576.8
999181	D-08-07-20DDD				AWC-New-40	1000	1500	548.4	48.4	0	0	739.1	485.8	419.7	527.8	575.8	575.8
999182	D-08-07-03AAA				AWC-New-41	500	1500	908.0	-94.0	0	0	0	469.8	416	665	725.5	725.5
999183	D-06-07-03ACC				AWC-New-42	500	1500	291.0	-380.0	0	0	0	469.8	416	665	725.5	725.5
999184	D-06-07-03ADD				AWC-New-43	500	1500	52.0	-592.0	0	0	0	469.8	416	665	725.5	725.5
999185	D-06-07-03BCC				AWC-New-44	500	1500	483.0	-96.0	0	0	0	469.8	416	665	725.5	725.5
999186	D-06-07-08ADD				AWC-New-45	500	1336	910.0	110.0	0	0	0	469.8	416	665	725.5	725.5
999187	D-06-07-08BBB				AWC-New-46	500	1137	911.0	311.0	0	0	0	469.8	416	665	725.5	725.5
999188	D-06-07-08DDD				AWC-New-47	500	1500	823.0	-86.0	0	0	0	469.8	416	665	725.5	725.5
999189	D-06-07-09AAA				AWC-New-48	500	1500	849.0	-87.0	0	0	0	469.8	416	665	725.5	725.6
999190	D-06-07-09ACC				AWC-New-49	500	1500	849.0	-87.0	0	0	0	469.8	416	665	725.5	725.5
999191	D-06-07-09ADD				AWC-New-50	500	1500	649.0	-87.0	0	0	0	469.8	416	665	725.5	725.5
999192	D-06-07-09DCC				AWC-New-51	500	1500	624.0	-81.0	0	0	0	469.8	416	665	725.5	725.5
999193	D-06-07-09DDD				AWC-New-52	500	1500	624.0	-81.0	0	0	0	469.8	416	665	725.5	725.5
999194	D-06-07-10ADD				AWC-New-53	500	1500	303.0	-485.0	0	0	0	469.8	416	665	725.5	725.5
999195	D-06-07-11BBB				AWC-New-54	500	1500	73.0	-583.0	0	0	0	469.8	416	665	725.5	725.5
999196	D-06-07-11BDD				AWC-New-55	500	1500	920.0	-80.0	0	0	0	469.8	416	665	725.5	725.5
999197	D-06-07-11DDD				AWC-New-56	500	1500	924.0	-76.0	0	0	0	469.8	416	665	725.5	725.5
999198	D-06-07-12ADD				AWC-New-57	500	1500	925.0	-75.0	0	0	0	469.8	416	665	725.5	725.5
999199	D-06-07-12BBB				AWC-New-58	500	1500	922.0	-78.0	0	0	0	469.8	416	665	725.5	725.5
999200	D-06-07-12DCC				AWC-New-59	500	1500	930.0	-70.0	0	0	0	469.8	416	665	725.5	725.5
999201	D-06-07-12DDD				AWC-New-60	500	1500	933.0	-67.0	0	0	0	469.8	416	665	725.5	725.5
999202	D-06-07-13BDD				AWC-New-61	500	1500	935.0	-65.0	0	0	0	469.8	416	665	725.5	725.5
999203	D-06-07-13CDD				AWC-New-62	500	1500	937.0	-63.0	0	0	0	469.8	416	665	725.5	725.5
999204	D-06-07-14ADD				AWC-New-63	500	1500	930.0	-70.0	0	0	0	469.8	416	665	725.5	725.5
999205	D-06-07-14BDD				AWC-New-64	500	1500	930.0	-70.0	0	0	0	469.8	416	665	725.5	725.5
999206	D-06-07-16ADD				AWC-New-65	500	1500	593.0	-75.0	0	0	0	469.8	416	665	725.5	725.5

TABLE 6
Wells Used to Simulate Arizona Water Company Demand

999207	D-06-07-17ADD				AWC-New-66	500	1500	782.0	-81.0	0	0	0	469.8	416	665	725.5	725.5
999208	D-06-07-20CDD				AWC-New-67	500	1500	779.0	-66.0	0	0	0	469.8	416	665	725.5	725.5
999209	D-06-07-20DDD				AWC-New-68	500	1500	779.0	-66.0	0	0	0	469.8	416	665	725.5	725.5
999210	D-06-07-21CDD				AWC-New-69	500	1500	676.0	-63.0	0	0	0	469.8	416	665	725.5	725.5
999211	D-06-07-21DDD				AWC-New-70	500	1500	577.0	-460.0	0	0	0	469.8	416	665	725.5	725.5
999212	D-06-07-22CDD				AWC-New-71	500	1500	452.0	-457.0	0	0	0	469.8	416	665	725.5	725.5
999213	D-06-07-22DDD				AWC-New-72	500	1500	302.0	-555.0	0	0	0	469.8	416	665	725.5	725.5
999214	D-06-07-23ADD				AWC-New-73	500	1500	941.0	-59.0	0	0	0	469.8	416	665	725.5	725.5
999215	D-06-07-23BDD				AWC-New-74	500	1500	941.0	-59.0	0	0	0	469.8	416	665	725.5	725.5
999216	D-06-07-23CDD				AWC-New-75	500	1500	947.0	-53.0	0	0	0	469.8	416	665	725.5	725.5
999217	D-06-07-24BDD				AWC-New-76	500	1500	943.0	-57.0	0	0	0	469.8	416	665	725.5	725.5
999218	D-06-07-25AAA				AWC-New-77	500	1500	960.0	-40.0	0	0	0	469.8	416	665	725.5	725.5
999219	D-06-07-25ACC				AWC-New-78	500	1500	957.0	-43.0	0	0	0	469.8	416	665	725.5	725.5
999220	D-06-07-25CDD				AWC-New-79	500	1500	963.0	-37.0	0	0	0	469.8	416	665	725.5	725.5
999221	D-06-07-25DDD				AWC-New-80	500	1500	963.0	-37.0	0	0	0	469.8	416	665	725.5	725.5
999222	D-06-07-26ACC				AWC-New-81	500	1500	954.0	-46.0	0	0	0	469.8	416	665	725.5	725.5
999223	D-06-07-26ADD				AWC-New-82	500	1500	954.0	-46.0	0	0	0	469.8	416	665	725.5	725.5
999224	D-06-07-26CCC				AWC-New-83	500	1500	90.0	-442.0	0	0	0	469.8	416	665	725.5	725.5
999225	D-06-07-27ACC				AWC-New-84	500	1500	288.0	-550.0	0	0	0	469.8	416	665	725.5	725.5
999226	D-06-07-27ADD				AWC-New-85	500	1500	288.0	-550.0	0	0	0	469.8	416	665	725.5	725.5
999227	D-06-07-27DCC				AWC-New-86	500	1500	261.0	-544.0	0	0	0	469.8	416	665	725.5	725.5
999228	D-06-07-28ADD				AWC-New-87	500	1500	586.0	-55.0	0	0	0	469.8	416	665	725.5	725.5
999229	D-06-07-28DCC				AWC-New-88	500	1500	589.0	-50.0	0	0	0	469.8	416	665	725.5	725.5
999230	D-06-07-28DDD				AWC-New-89	500	1500	589.0	-50.0	0	0	0	300.7	416	665	725.5	725.5
999231	D-06-07-29ADD				AWC-New-90	500	1450	817.0	-10.0	0	0	0	0	416	665	725.5	725.5
999232	D-06-07-29DDD				AWC-New-91	500	1331	833.0	114.0	0	0	0	0	416	665	725.5	725.5
999233	D-06-07-35CDD				AWC-New-92	500	1500	970.0	-30.0	0	0	0	0	416	665	725.5	725.5
999234	D-06-07-36CDD				AWC-New-93	500	1500	974.0	-26.0	0	0	0	0	416	665	725.5	725.5
999235	D-06-07-36DDD				AWC-New-94	500	1500	976.0	-24.0	0	0	0	0	416	665	725.5	725.5
999236	D-06-08-01ABB				AWC-New-95	500	1500	982.0	-18.0	0	0	0	0	505	636.7	694.5	694.5
999237	D-06-08-01ACC				AWC-New-96	500	1500	984.0	-16.0	0	0	0	0	505	636.7	694.5	694.5
999238	D-06-08-01DCC				AWC-New-97	500	1500	987.0	-13.0	0	0	0	0	505	636.7	694.5	694.5
999239	D-06-08-08ADD				AWC-New-98	500	1500	931.0	-69.0	0	0	0	0	505	636.7	694.5	694.5
999240	D-06-08-08BBB				AWC-New-99	500	1500	930.0	-70.0	0	0	0	0	505	636.7	694.5	694.5
999241	D-06-08-10ACC				AWC-New-100	500	1500	940.0	-60.0	0	0	0	0	505	636.7	694.5	694.5
999242	D-06-08-11ABB				AWC-New-101	500	1500	960.0	-40.0	0	0	0	0	505	636.7	694.5	694.5
999243	D-06-08-11CDD				AWC-New-102	500	1500	951.0	-49.0	0	0	0	0	505	636.7	694.5	694.5
999244	D-06-08-12AAA				AWC-New-103	500	1500	989.0	-11.0	0	0	0	0	505	636.7	694.5	694.5
999245	D-06-08-12ACC				AWC-New-104	500	1500	989.0	-11.0	0	0	0	0	505	636.7	694.5	694.5
999246	D-06-08-12CDD				AWC-New-105	500	1500	991.0	-9.0	0	0	0	0	505	636.7	694.5	694.5
999247	D-06-08-13ACC				AWC-New-106	500	1500	992.0	-8.0	0	0	0	0	505	636.7	694.5	694.5
999248	D-06-08-13BCC				AWC-New-107	500	1500	976.0	-24.0	0	0	0	0	505	636.7	694.5	694.5
999249	D-06-08-13CDD				AWC-New-108	500	1500	977.0	-23.0	0	0	0	0	505	636.7	694.5	694.5
999250	D-06-08-13DDD				AWC-New-109	500	1500	992.0	-8.0	0	0	0	0	505	636.7	694.5	694.5
999251	D-06-08-14CDD				AWC-New-110	500	1500	964.0	-36.0	0	0	0	0	505	636.7	694.5	694.5
999252	D-06-08-15ADD				AWC-New-111	500	1500	947.0	-53.0	0	0	0	0	505	636.7	694.5	694.5
999253	D-06-08-15CDD				AWC-New-112	500	1500	949.0	-51.0	0	0	0	0	505	636.7	694.5	694.5
999254	D-06-08-16DDD				AWC-New-113	500	1500	948.0	-52.0	0	0	0	0	505	636.7	694.5	694.5
999255	D-06-08-19BCC				AWC-New-114	500	1500	932.0	-68.0	0	0	0	0	505	636.7	694.5	694.5
999256	D-06-08-19BDD				AWC-New-115	500	1500	951.0	-49.0	0	0	0	0	505	636.7	694.5	694.5

TABLE 6
Wells Used to Simulate Arizona Water Company Demand

999257	D-06-08-20ACC				AWC-New-116	500	1500	953.0	-47.0	0	0	0	0	505	636.7	694.5	694.5
999258	D-06-08-20BCC				AWC-New-117	500	1500	953.0	-47.0	0	0	0	0	505	636.7	694.5	694.5
999259	D-06-08-20DCC				AWC-New-118	500	1500	959.0	-41.0	0	0	0	0	505	636.7	694.5	694.5
999260	D-06-08-20DDD				AWC-New-119	500	1500	958.0	-41.0	0	0	0	0	505	636.7	694.5	694.5
999261	D-06-08-21BCC				AWC-New-120	500	1500	953.0	-47.0	0	0	0	0	505	636.7	694.5	694.5
999262	D-06-08-21CDD				AWC-New-121	500	1500	960.0	-40.0	0	0	0	0	505	636.7	694.5	694.5
999263	D-06-08-22ACC				AWC-New-122	500	1500	955.0	-45.0	0	0	0	0	505	636.7	694.5	694.5
999264	D-06-08-22ADD				AWC-New-123	500	1500	955.0	-45.0	0	0	0	0	505	636.7	694.5	694.5
999265	D-06-08-22DDD				AWC-New-124	500	1500	960.0	-40.0	0	0	0	0	505	636.7	694.5	694.5
999266	D-06-08-23ADD				AWC-New-125	500	1500	966.0	-34.0	0	0	0	0	505	636.7	694.5	694.5
999267	D-06-08-23CDD				AWC-New-126	500	1500	969.0	-31.0	0	0	0	0	505	636.7	694.5	694.5
999268	D-06-08-23DDD				AWC-New-127	500	1500	969.0	-31.0	0	0	0	0	505	636.7	694.5	694.5
999269	D-06-08-24ADD				AWC-New-128	500	1500	992.0	-8.0	0	0	0	0	505	636.7	694.5	694.5
999270	D-06-08-24BDD				AWC-New-129	500	1500	978.0	-22.0	0	0	0	0	505	636.7	694.5	694.5
999271	D-06-08-24CDA				AWC-New-130	500	1500	993.0	-7.0	0	0	0	0	505	636.7	694.5	694.5
999272	D-06-08-24DDA				AWC-New-131	500	1500	993.0	-7.0	0	0	0	0	505	636.7	694.5	694.5
999273	D-06-08-30AAA				AWC-New-132	500	1500	964.0	-36.0	0	0	0	0	505	636.7	694.5	694.5
999274	D-06-08-30BAA				AWC-New-133	500	1500	962.0	-38.0	0	0	0	0	505	636.7	694.5	694.5
999275	D-06-08-30BCC				AWC-New-134	500	1500	960.0	-40.0	0	0	0	0	505	636.7	694.5	694.5
999276	D-06-08-30BDD				AWC-New-135	500	1500	962.0	-38.0	0	0	0	0	505	636.7	694.5	694.5
999277	D-06-08-30CDD				AWC-New-136	500	1500	966.0	-32.0	0	0	0	0	505	636.7	694.5	694.5
999278	D-06-08-31ADD				AWC-New-137	500	1500	974.0	-26.0	0	0	0	0	505	636.7	694.5	694.5
999279	D-06-08-31BDD				AWC-New-138	500	1500	974.0	-26.0	0	0	0	0	505	636.7	694.5	694.5
999280	D-06-08-31CDD				AWC-New-139	500	1500	979.0	-21.0	0	0	0	0	505	636.7	694.5	694.5
999281	D-06-08-31DDD				AWC-New-140	500	1500	979.0	-21.0	0	0	0	0	505	636.7	694.5	694.5
999298	D-06-09-04BAA				AWC-New-141	500	1500	569.0	-450.0	0	0	0	0	224.4	274.4	299.4	299.4
999299	D-06-09-04CDD				AWC-New-142	500	1500	684.0	-416.0	0	0	0	0	224.4	274.4	299.4	299.4
999300	D-06-09-04DDD				AWC-New-143	500	1500	684.0	-418.0	0	0	0	0	224.4	274.4	299.4	299.4
999301	D-06-09-05AAA				AWC-New-144	500	1500	475.0	35.0	0	0	0	0	224.4	274.4	299.4	299.4
999302	D-06-09-05BAA				AWC-New-145	500	1500	475.0	35.0	0	0	0	0	224.4	274.4	299.4	299.4
999303	D-06-09-05BCC				AWC-New-146	500	1500	430.0	26.0	0	0	0	0	224.4	274.4	299.4	299.4
999304	D-06-09-05CCC				AWC-New-147	500	1500	475.0	-470.0	0	0	0	0	224.4	274.4	299.4	299.4
999305	D-06-09-05DDD				AWC-New-148	500	1500	615.0	-440.0	0	0	0	0	224.4	274.4	299.4	299.4
999306	D-06-09-06BBB				AWC-New-149	500	1500	995.0	-5.0	0	0	0	0	224.4	274.4	299.4	299.4
999307	D-06-09-06BCC				AWC-New-150	500	1500	998.0	-2.0	0	0	0	0	224.4	274.4	299.4	299.4
999309	D-06-09-06DBB				AWC-New-151	500	1500	265.0	-488.0	0	0	0	0	224	274.4	299.4	299.4
999310	D-06-09-06DCC				AWC-New-152	500	1500	290.0	-485.0	0	0	0	0	224	274.4	299.4	299.4
999312	D-06-09-08ADD				AWC-New-153	500	1500	516.0	-448.0	0	0	0	0	224	274.4	299.4	299.4
999313	D-06-09-08BCC				AWC-New-154	500	1500	412.0	-464.0	0	0	0	0	224	274.4	299.4	299.4
999314	D-06-09-08CCC				AWC-New-155	500	1500	412.0	-464.0	0	0	0	0	224	274.4	299.4	299.4
999315	D-06-09-08DCC				AWC-New-156	500	1500	516.0	-448.0	0	0	0	0	149	274.4	299.4	299.4
999316	D-06-09-08DDD				AWC-New-157	500	1500	516.0	-448.0	0	0	0	0	0	274.4	299.4	299.4
999317	D-06-09-09ACC				AWC-New-158	500	1500	676.0	-408.0	0	0	0	0	0	274.4	299.4	299.4
999318	D-06-09-09BCC				AWC-New-159	500	1500	590.0	-430.0	0	0	0	0	0	274.4	299.4	299.4
999319	D-06-09-09DCC				AWC-New-160	500	1500	676.0	-408.0	0	0	0	0	0	274.4	299.4	299.4
999320	D-06-09-09DDD				AWC-New-161	500	1500	676.0	-408.0	0	0	0	0	0	274.4	299.4	299.4
999347	D-06-09-16ACC				AWC-New-162	500	1500	660.0	-404.0	0	0	0	0	0	274.4	299.4	299.4
999348	D-06-09-16CCC				AWC-New-163	500	1500	541.0	-424.0	0	0	0	0	0	274.4	299.4	299.4
999349	D-06-09-16DCC				AWC-New-164	500	1500	637.0	-400.0	0	0	0	0	0	274.4	299.4	299.4
999350	D-06-09-16DDD				AWC-New-165	500	1500	637.0	-400.0	0	0	0	0	0	274.4	299.4	299.4

TABLE 6
Wells Used to Simulate Arizona Water Company Demand

999351	D-06-09-17ACC				AWC-New-166	500	1500	474.0	-445.0	0	0	0	0	0	274.4	299.4	299.4
999352	D-06-09-17ADD				AWC-New-167	500	1500	474.0	-445.0	0	0	0	0	0	274.4	299.4	299.4
999353	D-06-09-17CCC				AWC-New-168	500	1500	260.0	-459.0	0	0	0	0	0	274.4	299.4	299.4
999354	D-06-09-17DCC				AWC-New-169	500	1500	430.0	-443.0	0	0	0	0	0	274.4	299.4	299.4
999355	D-06-09-18ACB				AWC-New-170	500	1500	1023.0	23.0	0	0	0	0	0	274.4	299.4	299.4
999356	D-06-09-18CBB				AWC-New-171	500	1500	1008.0	8.0	0	0	0	0	0	274.4	299.4	299.4
999357	D-06-09-18DBB				AWC-New-172	500	1500	1025.0	25.0	0	0	0	0	0	274.4	299.4	299.4
999358	D-06-09-19ACC				AWC-New-173	600	1500	1026.0	26.0	0	0	0	0	0	274.4	299.4	299.4
999359	D-06-09-19DCC				AWC-New-174	500	1500	1025.0	25.0	0	0	0	0	0	274.4	299.4	299.4
999360	D-06-09-20ACC				AWC-New-175	500	1500	390.0	-439.0	0	0	0	0	0	274.4	299.4	299.4
999361	D-06-09-20ADD				AWC-New-176	500	1500	390.0	-439.0	0	0	0	0	0	274.4	299.4	299.4
999362	D-06-09-20BCC				AWC-New-177	500	1500	1026.0	26.0	0	0	0	0	0	274.4	299.4	299.4
999363	D-06-09-20CCC				AWC-New-178	500	1500	1025.0	25.0	0	0	0	0	0	274.4	299.4	299.4
999364	D-06-09-20DCC				AWC-New-179	500	1500	339.0	-438.0	0	0	0	0	0	274.4	299.4	299.4
999365	D-06-09-20DDD				AWC-New-180	500	1500	339.0	-438.0	0	0	0	0	0	274.4	299.4	299.4
999366	D-06-09-21ACC				AWC-New-181	500	1500	608.0	-398.0	0	0	0	0	0	274.4	299.4	299.4
999367	D-06-09-21DCC				AWC-New-182	500	1500	572.0	-394.0	0	0	0	0	0	275	299.4	299.4
999368	D-06-09-21DDD				AWC-New-183	500	1500	572.0	-394.0	0	0	0	0	0	275	299.4	299.4
										17,153	25,001	45,002	55,000	75,500	110,000	120,000	120,000

Table 7
Zone Budget Analysis of Current Committed Demand

MODFLOW ZoneBudget No.	Zone Description	Demand (AFY)	Model Pumping SP-52 (ft^3/d)	Model Pumping SP-52 (AF)	Model Deficit (AF)	% Model Simulated
	Maricopa-Stanfield Sub-basin					
25	Santa Cruz Water Company	37,390.43	4,511,800	37,805	415	101%
34	Copper Mountain Comm. Designation	4,613.66	550,960	4,617	3	100%
35	Santa Rosa Water Co. Designation	9,476.09	1,130,800	9,475	-1	100%
36	Ranches at Maricopa Designation	42.00	5,004	42	0	100%
37	Thunderbird Farms Improvement District	1,125.44	134,340	1,126	0	100%
38	Maricopa DWID	26.40	3,156	26	0	100%
	MST Sub-basin Totals	**52,674.02**		**53,091**	**417**	**101%**
	Eloy Sub-basin					
26	Eloy Designation	48,545.00	5,792,400	48,536	-9	100%
27	Johnson Pinal DAWS	1,597.00	190,540	1,597	0	100%
28	Florence Designation	12,310.00	1,468,500	12,305	-5	100%
29	Palmilla Designation	2,810.77	335,660	2,813	2	100%
30	Picacho Water Co. Designation	12,256.74	1,463,100	12,260	3	100%
31	Woodruff Water Company	9,695.06	1,156,300	9,689	-6	100%
32	Sunland Water Co. Designation	649.89	77,564	650	0	100%
33	Villa Grande DWID Designation	100.81	11,933	100	-1	99%
39	Picacho Water Improvement District	780.10	93,154	781	0	100%
	Eloy Sub-basin Totals	**88,745.37**		**88,729**	**-16**	**100.0%**
	TOTAL	**141,419.39**		**141,820.53**	**401.14**	**100.3%**

24	Arizona Water Company	120,000	14,324,000	120,024.33	24.33	100.0%

AFY acre-feet/year
AF acre-feet
SP Stress period (SP 52 is the last stress period and represents 100-years)

Economic *SYNOPSES*

short essays and reports on the economic issues of the day

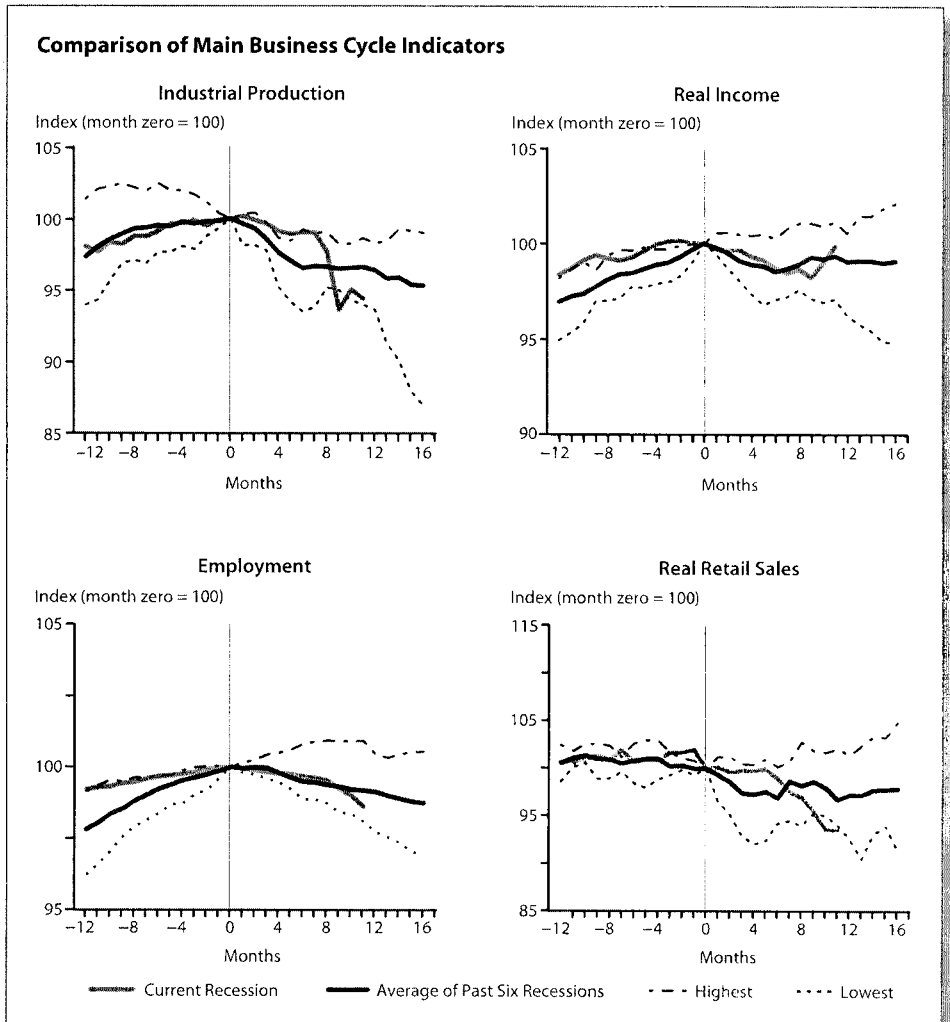
2009 ■ Number 4

The Current Recession: How Bad Is It?

Charles S. Gascon, *Senior Research Associate*

On November 28, 2008, the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) declared that a recession began in the United States in December 2007.[1] This committee defines a recession as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in production, employment, real income, and other indicators." The U.S. economy has experienced six recessions over the past 40 years. On average these recessions have lasted 10.7 months. The longest recessions—beginning in November 1973 and July 1981—each lasted 16 months. The shortest recession—beginning in January 1980—lasted only six months. Although the end of the current recession is unclear, many economists expect it to extend into mid-2009, a duration of around 18 months.

"In a recession, the severity of the decline is just as relevant as the duration of the recession."



The most skeptical economists believe that because of the contraction in the housing market and problems in financial markets, the magnitude of the current recession could be the most severe in decades, perhaps comparable to the Great Depression. Although the causes of the current recession may be unique, main recession indicators have moved in a predictable fashion.

In a recession, the severity of the decline is just as relevant as the duration of the recession. These two measures are not independent; a prolonged but shallow recession may have an aggregate impact similar to a short but deep recession.

To compare the current recession with the past six recessions, the chart plots four main economic indicators used by the NBER: industrial production, real personal income less transfer payments, employment, and real retail sales and food services.[2] Each series is indexed to 100 at the start of the recession. The horizontal axis indicates the number of months before (negative values) and after (positive values) the start of a recession, where zero indicates the month the NBER determined the economy moved into a recession.[3] The black line indicates the averages over the past six recessions,[4] the blue line data on the most recent recession, and the two dashed lines the highest and lowest values of each series, capturing variability across the past recessions.

Based on these indicators, the current recession has been worse than average; however, the declines are not unprecedented. In the previous recessions, industrial production tended to decline sharply at the business cycle peak; in the current recession, it did not decline sharply until early 2008. In the current recession, real income declines have been significant; at the start of the recession, incomes were above their pre-recession averages but are now slightly below average. Current employment trends are consistent with past recessions, although in recent months employment has begun to approach its lowest levels. The most disturbing current indicator is the decline in real retail sales. Historically, retail sales have stabilized within months of the beginning of a recession; eleven months into this recession retail sales continue to decline.

Main recession indicators tend to support the claim that this recession could be the most severe in the past 40 years. However, we are still far from another Great Depression. The severities of the declines experienced so far have been consistent with past recessions, and although the length of the current recession could set a record, it will likely be only by a few months. ∎

[1] The NBER is a not-for-profit corporation that sponsors economic research and promotes dialog on economic issues. By informal consensus, economists and policymakers accept the Business Cycle Dating Committee's judgment on business cycle turning points. The NBER report is available at wwwdev.nber.org/cycles/dec2008.html.

[2] Deflated using the Consumer Price Index for All Urban Consumers (1982-84 = 100).

[3] According to the NBER, recessions began in December 1969 (lasting 11 months), November 1973 (16), January 1980 (6), July 1981 (16), July 1990 (8), and March 2001 (8).

[4] Because some recessions were shorter than 16 months, the average is pulled upward toward the end of the sample.

U. S. STRATEGY REPORT

8 REASONS WHY (WE BELIEVE) THE RECESSION IS OVER

We believe the worst recession since the 1930s is over. Signs of recovery are everywhere. It's time for investors to look forward and to stop looking back. In this report, we discuss eight reasons why we believe this recession may be over.

1 Leading economic indicators are positive.

The Conference Board's Index of Leading Economic Indicators, which is designed to anticipate changes in the economy by three to six months, rose 0.6% in July for its fourth consecutive gain. This gauge has an impressive track record of calling turns in the economy. The stock market, another leading economic indicator, has already rebounded 50% from its March lows.

2 Global economies are recovering.

The Organisation for Economic Co-operation and Development's (OECD)[1] composite leading indicators for its member countries recorded their largest increase in June since records began in 1962. For the first time ever, all 33 countries recorded an increase. Japan's economy grew this past quarter for the first time since early last year. Europe also appears to be pulling out of recession, with positive growth reported in the most recent quarters in Germany and France.

3 The job market is improving.

Non-farm payrolls fell by just 247,000 in June, while the unemployment rate eased from 9.5% to 9.4%. The rate of decline in payrolls has been improving since January, when payrolls declined by 741,000. Employment has been a lagging indicator of the economy, improving at the end of or well after every recession in the postwar period.

4 The Federal Reserve's efforts to stabilize the financial system worked.

The massive efforts to slash interest rates and provide trillions in funds to the financial system have succeeded in restoring conditions in the money and corporate credit markets. Corporate America has taken advantage of attractive rates to refinance old debt and fund new acquisitions. Companies issued more than $800 billion in new bonds during the first seven months of 2009 – nearly a third more than a year earlier. In the money markets, the three-month London interbank offered rate is down to 0.43%, less than one-tenth of where this short-term benchmark stood at the worst of the credit crisis last October.

5 Bank lending is increasing.

Banks' profitability and capitalization have improved, and banks have started lending again. According to the Fed's recent periodic survey of banks, about 30% said, on net, they tightened lending to businesses in May, June and July, but that's down from roughly 40% in April's survey. The percentage of banks that tightened standards on commercial real estate loans dropped 20 percentage points to 45%. For residential real estate, the percentage fell to 20% from a peak of about 75% a year ago. Most banks expected lending standards across all loans would remain tighter than their average levels over the past decade until at least the second half of 2010. However, the improvement in bank lending should be enough to support economic recovery.

6 Expectations for 2010 economic growth continue to improve.

- In a recent *Wall Street Journal* survey, 80% of economists said they believe the recession either has ended or will end by September. In addition, economists continue to upgrade expectations for growth in the rest of 2009 and beyond.
- The top 50 U.S. economists[2] expect the economy to grow 2.2% in the third quarter, after falling just 1% in the second quarter.
- Economists in August lifted their projection for third-quarter growth by 1.2 percentage points over July's estimate to 2.2%, according to the median of 55 forecasts in a Bloomberg News survey. That is the biggest such boost in surveys dating from May 2003. Forecasts for 2010 were raised to 2.3% from 2.1%.
- The International Monetary Fund said in a recently revised forecast that the world economy will expand 2.5% in 2010, compared with its April projection of 1.9%.

Edward Jones
MAKING SENSE OF INVESTING

7 Housing has bottomed.

Sales of existing U.S. homes jumped more than expected in July to the highest level in almost two years, signaling the worst of the housing recession may have passed. Purchases climbed 7.2% to a 5.24 million annual rate, the most since August 2007, the National Association of Realtors said recently. The gain was the biggest since records began in 1999. The S&P/Case-Shiller home price index advanced 2.9% in the second quarter from the previous three months, the first increase since 2006 and the biggest in almost four years. Foreclosure-driven declines in prices, government credits for first-time buyers and near-record-low borrowing costs are expected to continue stoking demand.

8 Manufacturing is on the rebound.

The Fed said industrial production rose 0.5% in July, the first increase in nine months. European industrial orders increased 3.1% from May, the biggest gain in 19 months, according to the European Union's statistics office. For the first time since January 2008, an index based on a survey of U.S. purchasing managers crossed a threshold indicating factory output grew. Manufacturing activity in China, France and Australia, among other countries, also expanded in August, separate surveys showed. The pace of contraction in Germany and some other nations slowed markedly.

Why Does It Take So Long to Call Recessions "Officially Over"?

The official "scorekeeper" of recessions is the National Bureau of Economic Research (NBER), a private organization in Cambridge, Mass. These folks aren't terribly interested in forecasting turns in the economy. Instead, they focus on making sure their recession start and end dates are absolutely accurate and not subject to future revisions. Robert Hall, who heads the NBER's Business Cycle Dating Committee, recently said it is "more important" this time around for the group to adhere to the principle of not calling an end to the recession until after economic growth has surpassed its previous peak, "which could take 18 months or more to determine." The group took until July 2003, 20 months after the fact and well after stock prices had begun to recover, to declare the last recession had ended.

Don't Bet Against History

Historically, the stock market has performed well once recessions end. The chart below shows the performance of the S&P 500 six and 12 months after postwar recessions ended. While history is not always an accurate guide to the future, it does suggest that investors who are out of the market are betting against a lot of history.

S&P 500 Performance after Postwar Recessions

Recession End Dates	% Change 6 Months Later	% Change 12 Months Later
10/31/1949	10.97%	19.57%
5/25/1954	18.63	29.98
4/30/1958	17.77	37.12
2/28/1961	7.86	7.51
11/30/1970	15.06	4.49
3/31/1975	6.57	30.63
7/31/1980	1.28	1.82
11/30/1982	15.46	22.18
3/28/1991	3.55	12.14
11/30/2001	-1.66	-10.04
7/31/2009 (est.)	TBD	TBD
Average	**9.55%**	**15.54%**

Source: Ned Davis Research. Daily data starting in 1947. Six months measured by 126 market days; 12 months measured by 252 market days.

You Can't Recover If You're Not Invested

There are always risks to the outlook. The recovery could be uneven, or something unforeseen might derail the progress we've made. The stock market could correct at any time for any reason. But these things are unpredictable. Our advice remains the same: Don't base your investment decisions on predictions; base them on investment principles. Focus on the things you can control: the quality of the investments you own and the diversification of your portfolio. Maintain a long-term perspective.

It looks as though the economy is improving, but that doesn't mean you should throw caution to the wind. Instead, sit down with your Edward Jones financial advisor and talk about ways you can take advantage of the improving climate while still managing risk.

And remember, you can't recover if you're not invested.

1 The OECD, located in Paris, spells "organisation" as it's listed.

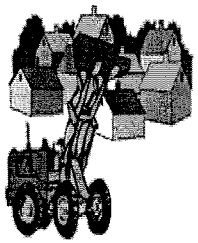
2 Latest Blue Chip Economic Indicators survey

Information in this report is as of 9/2/09.

Alan F. Skrainka, CFA
Chief Market Strategist

U.S. Census Bureau

2003 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2003 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	6,516	6,516	745,654,654	6,516	6,516	745,654,654
Browse	Two Family	26	52	3,505,196	26	52	3,505,196
Browse	Three and Four Family	23	90	3,493,721	23	90	3,493,721
Browse	Five or More Family	21	245	16,449,773	21	245	16,449,773
Browse	Total	6,586	6,903	769,103,344	6,586	6,903	769,103,344

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

Building Permit Estimates - U.S., State, and Metropolitan Areas Click this

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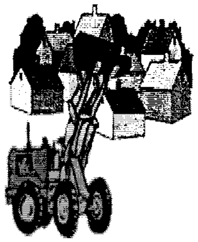
ATTACHMENT 10

U.S. Census Bureau

2004 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2004 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	10,041	10,041	1,224,011,137	10,020	10,020	1,221,528,608
Browse	Two Family	39	78	5,503,011	34	68	4,749,471
Browse	Three and Four Family	50	194	12,999,364	50	194	12,999,364
Browse	Five or More Family	9	54	2,848,049	9	54	2,848,049
Browse	Total	10,139	10,367	1,245,361,561	10,113	10,336	1,242,125,492

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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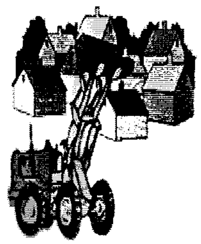
U.S. Census Bureau

2005 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2005 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	11,586	11,586	1,462,499,014	11,371	11,371	1,437,548,073
Browse	Two Family	20	40	2,714,607	8	16	1,095,000
Browse	Three and Four Family	40	138	10,464,851	33	112	8,782,034
Browse	Five or More Family	3	30	1,689,547	1	5	83,000
Browse	Total	11,649	11,794	1,477,368,019	11,413	11,504	1,447,508,107

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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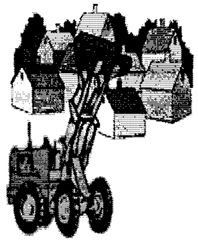
2006 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2006 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	8,470	8,470	1,110,584,637	7,660	7,660	999,219,293
Browse	Two Family	6	12	940,287	6	12	940,287
Browse	Three and Four Family	9	29	1,433,148	3	11	520,164
Browse	Five or More Family	2	41	2,916,615	1	36	2,595,306
Browse	Total	8,487	8,552	1,115,874,687	7,670	7,719	1,003,275,050

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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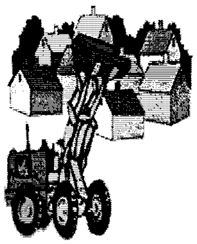
2007 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2007 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	6,221	6,221	772,573,693	6,065	6,065	754,921,701
Browse	Two Family	6	12	833,450	3	6	439,982
Browse	Three and Four Family	10	40	2,871,419	7	28	2,146,247
Browse	Five or More Family	6	30	2,162,754	0	0	0
Browse	Total	6,243	6,303	778,441,316	6,075	6,099	757,507,930

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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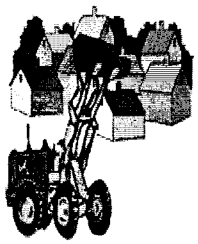
2008 Building Permits



Annual New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

2008 Go!

	Item	Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	3,014	3,014	370,179,921	3,014	3,014	370,179,921
Browse	Two Family	1	2	194,441	1	2	194,441
Browse	Three and Four Family	1	4	239,000	1	4	239,000
Browse	Five or More Family	0	0	0	0	0	0
Browse	Total	3,016	3,020	370,613,362	3,016	3,020	370,613,362

[N/A = Reported data not available for the time period]
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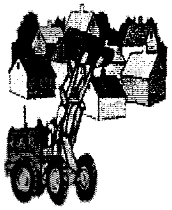
2009 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2009 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	258	258	32,572,616	227	227	28,444,477	1,538	1,538	198,133,203	1,507	1,507	194,005,064
Browse	Two Family	0	0	0	0	0	0	0	0	0	0	0	0
Browse	Three and Four Family	0	0	0	0	0	0	0	0	0	0	0	0
Browse	Five or More Family	0	0	0	0	0	0	0	0	0	0	0	0
Browse	Total	258	258	32,572,616	227	227	28,444,477	1,538	1,538	198,133,203	1,507	1,507	194,005,064

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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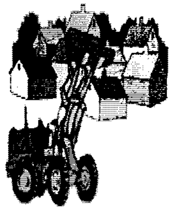
2008 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2008 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	205	205	24,134,704	192	192	22,575,141	2,502	2,502	307,040,285	2,390	2,390	293,975,034
Browse	Two Family	0	0	0	0	0	0	2	4	325,597	1	2	194,441
Browse	Three and Four Family	0	0	0	0	0	0	2	7	461,843	1	4	239,000
Browse	Five or More Family	1	5	360,459	0	0	0	5	25	1,802,295	0	0	0
Browse	Total	206	210	24,495,163	192	192	22,575,141	2,511	2,538	309,630,020	2,392	2,396	294,408,475

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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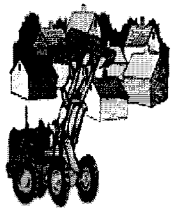
2007 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2007 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	515	515	51,265,309	498	498	49,286,618	5,009	5,009	598,834,855	4,897	4,897	586,304,182
Browse	Two Family	0	0	0	0	0	0	6	12	833,450	3	6	439,982
Browse	Three and Four Family	0	0	0	0	0	0	10	40	2,871,419	7	28	2,146,247
Browse	Five or More Family	1	5	360,459	0	0	0	3	15	1,081,377	0	0	0
Browse	Total	516	520	51,625,768	498	498	49,286,618	5,028	5,076	603,621,101	4,907	4,931	588,890,411

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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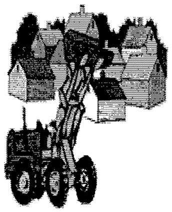
2006 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2006 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	458	458	62,333,682	358	358	48,918,653	5,754	5,754	774,486,637	5,105	5,105	689,310,327
Browse	Two Family	1	2	150,708	0	0	0	16	32	2,317,076	6	12	940,287
Browse	Three and Four Family	2	6	309,339	1	3	157,175	14	45	2,472,389	3	11	520,164
Browse	Five or More Family	0	0	0	0	0	0	1	5	321,309	0	0	0
Browse	Total	461	466	62,793,729	359	361	49,075,828	5,785	5,836	779,597,411	5,114	5,128	690,770,778

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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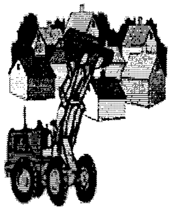
U.S. Census Bureau

2005 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2005 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	871	871	109,778,975	759	759	96,206,016	8,237	8,237	1,019,716,092	7,933	7,933	983,013,555
Browse	Two Family	1	2	150,708	0	0	0	14	28	1,962,338	8	16	1,095,000
Browse	Three and Four Family	5	17	1,120,262	3	9	532,436	36	124	9,298,620	32	109	8,196,446
Browse	Five or More Family	1	5	263,708	0	0	0	3	30	1,870,255	0	0	0
Browse	Total	878	895	111,313,653	762	768	96,738,452	8,290	8,419	1,032,847,305	7,973	8,058	992,305,001

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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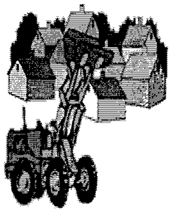
2004 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2004 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	713	713	88,048,209	629	629	78,173,643	6,490	6,490	785,990,261	6,315	6,315	765,499,145
Browse	Two Family	2	4	293,708	1	2	143,000	31	62	4,396,445	29	58	4,131,939
Browse	Three and Four Family	3	12	705,000	3	12	705,000	23	87	5,499,845	23	87	5,499,845
Browse	Five or More Family	1	19	1,275,697	0	0	0	3	39	2,618,536	0	0	0
Browse	Total	719	748	90,322,614	633	643	79,021,643	6,547	6,678	798,505,087	6,367	6,460	775,130,929

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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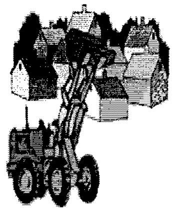
2003 Building Permits



Monthly New Privately-Owned Residential Building Permits
Pinal County, Arizona (021)

August 2003 Go!

	Item	Current Month						Cumulative Year to Date					
		Estimates with Imputation			Reported only			Estimates with Imputation			Reported only		
		Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost	Buildings	Units	Construction cost
Browse	Single Family	648	648	76,049,504	592	592	69,562,801	4,384	4,384	497,863,192	4,105	4,105	465,980,220
Browse	Two Family	2	4	204,000	2	4	204,000	17	34	2,275,583	17	34	2,275,583
Browse	Three and Four Family	0	0	0	0	0	0	13	52	1,643,144	13	52	1,643,144
Browse	Five or More Family	0	0	0	0	0	0	1	20	945,829	0	0	0
Browse	Total	650	652	76,253,504	594	596	69,766,801	4,415	4,490	502,727,748	4,135	4,191	469,898,947

[N/A = Reported data not available for the time period]
Source: U.S. Bureau of the Census

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